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User Manual

XV1

Intel Quad-Core Xeon CPU / Up to 2.13 GHz / 6RU VME64 Platform
1/2/3 PMC Slots / 1-Gigabit Ethernet / SATA II / SVGA / USB / IDE / Floppy / Audio

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XV1 Hardware Manual

Version 1.2—February 2012

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CE

This product complies with the European EMC Directive (2004/108/EC) and the European Low Voltage Safety Directive (2006/95/EC)/.

Safety Precautions

Instructions regarding safety precautions during installation, operation, or maintenance of the equipment are given in the section entitled “Safety Instructions” on page iv.

WARNINGS and CAUTIONS

The definitions of WARNINGS and CAUTIONS as used in this document are given in the Preface in the section entitled “Notes, Cautions, Warnings, and Sidebars” on page xxii.

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XV1 Hardware Manual, Version 1.2

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Version Revision History

Version 1.2 ..... February 2012

- Specified the factory default option of connecting the front panel to ground as being “no connection.” Added clarification regarding the option of connecting front panel to ground. (Body text appears in note at the bottom of page 3 of Appendix A)

Version 1.1..... December 2011

- Added information about the FPIO-Expansion Board and Rear Transition Module throughout the manual.
- Moved the location of the ES1000 graphics chip to the PCI bus on the ICH to reflect current Rev of the XV1 in *Figure 2-1*, page 2-2 block diagram.
- Made note that there is no minimum duration that JP1 needs to be on in order to clear CMOS.
- Added section for post battery replacement and reconfigure of BIOS settings.
- Added information about the ES1000 graphics chip.
- Made changes to the signal descriptions for the VME P2 connector to reflect current Rev.
- Specified routing options for various I/O (Front-Panel / P2).
- Added information regarding the the LEDs on the XV1 baseboard.
- Repackaging appendix has been rewritten to reflect new packaging materials and repackaging instructions.
- Assorted minor edits and changes throughout the manual.

Version 1.0 ..... June 2009

Safety Instructions

To maximize user safety and ensure correct device operation, all instructions contained in this section should be read carefully.

Caution: It is important that the user observe all warnings and instructions that are on the device and contained in this manual.

- The device must be used in accordance with the instructions for use.
- Electrical installations in the room must correspond to the requirements of respective regulations.
- Take care that there are no cables, particularly mains cables, in areas where persons can trip over them.
- Do not use a mains connection in sockets shared by a number of other power consumers. Do not use an extension cable.
- Do not set up the device in the proximity of heat sources or in a damp location. Make sure the device has adequate ventilation.
- All connection cables must be screwed or locked to the chassis housing.
- The device is no longer safe to operate when
  - — the device has visible damage or
  - — the device no longer functions.
- In these cases, the device must be shut down and secured against unintentional operation.
- Repairs may only be carried out by a person authorized by Themis Computer.
- If extensions are made to the device, the legal stipulations and the device specifications must be observed.

Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. Always take the following precautions:

1. Transport boards in static-safe containers such as boxes or bags.
2. Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
3. Always be properly grounded when touching a sensitive board, component, or assembly.
4. Store electrostatic-sensitive boards in protective packaging or on conductive foam.

Grounding Methods

Guard against electrostatic damage at workstations by following these steps:

1. Cover workstations with approved anti-static material. Provide a wrist strap connected to a work surface and properly grounded tools and equipment.
2. Use anti-static mats, heel straps, or air ionizers to give added protection.
3. Handle electrostatic-sensitive components, boards, and assemblies by the case or the PCB edge.
4. Avoid contact with pins, leads, or circuitry.
5. Turn off power and input signals before inserting and removing connectors or test equipment.
6. Keep the work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
7. Use field service tools, such as cutters and screwdrivers, that are conductive.
8. Always place drives and boards PCB-assembly-side down on the foam.

Instructions for the Lithium Battery

Motherboards are installed with a lithium battery. To replace this battery, please observe the instructions that are described in this manual.

Warning: There is a danger of explosion when the wrong type of battery is used as a replacement.

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Reader Comment Card

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Preface Section

How to Use This Manual

The Themis XV1 (see *Figure 1* for the single-slot model) is a high-performance 6RU VME-bus computer with an Intel® quad-core Xeon™ processor that operates at 2.13 GHz. It supports a variety of I/O from the front panel—including gigabit Ethernet, USB 2.0, SATA Revision 1.0a (at speeds up to 3.0 Gb/s), serial, and SVGA graphics—as well as from the VME P2 backplane connector—including PS/2 KB/mouse and HDA stereo audio, with additional access to USB 2.0, SATA, serial, and SVGA graphics. Connection to signals on the VME P2 backplane is made through a Themis paddle board.

Up to 8 GB of DDR2 SDRAM memory (4 GB for model XV1/1; see *Table 1*, page xix)—as well as a standard PMC/XMC Module card (64 bit @66 MHz & 32 bit @33Mhz)(depending on site installed)—can be installed on two models of the XV1. Operating systems include Linux, and Microsoft Windows. Please specify OS and OS version at time of purchase.

This *XV1 Hardware Manual* [P/N 116704-022] describes models of the XV1 presently available (see *Table 1*; also see *Figure 2* and *Figure 3* on page xviii).

Figure 1. Model XV1/1 6RU VME-Bus Quad-Core Xeon Computer

Figure 2. Model XV1/2 6RU VME-Bus Quad-Core Xeon Computer

Figure 3. Model XV1/3 6RU VME-Bus Quad-Core Xeon Computer

Themis Computer values its customer comments and opinions; therefore, a “Reader Comment Card” is located at the end of this manual for your use. Please take the time to fill out this card with any comments concerning Themis products and services, and return it to Themis Computer. Your comments may also be forwarded to Themis by sending email to docfeedback@themis.com.

Before you begin, carefully read each of the procedures in this manual. Serious damage can be caused by improper handling of the equipment.

XV1 Models

The XV1 has a total of three models (see *Table 1*).

Table 1. XV1 Model Configurations

Model	Baseboard
	PMC/XMC Modules
XV1 / 1	1 Module (1 VME Slot)
XV1 / 2	2 Modules (2 VME Slots)
XV1 / 3	3 Modules (2 VME Slots)

Caution: The original Themis 2P2 PMC/XMC Carrier Board or 2P2/2P3 PMC Carrier Boards cannot be installed onto the XV1. A different PMC/XMC Carrier Board is available for use with the XV1. Please contact Themis for further details.

The XV1 provides an onboard 2D Graphics accelerator. Users may obtain greater graphics capability by installing a TGA-7000 PMC graphics accelerator, T2GPX XMC Graphics Card, or any other graphics solution which follows PMC/XMC-module standards in one of the XV1 PMC/XMC module Sites. Onboard XV1 graphics must be disabled using jumper-pin JP7 (see Appendix B, “Jumper Pins and Solder Beads”).

Intended Audience

This manual is written for system integrators and programmers. It contains all necessary information for installation and configuration of the XV1 and assumes the BIOS program code is installed in the system Flash memory. If you intend to operate the XV1 with an operating system other than Linux, or Windows, such as Vx Works or some other real-time kernel, please consult the appropriate documentation supplements accompanying your OS or kernel software.

Although all specific hardware features are described in the Hardware manual, programmers wishing to write code for the XV1 without the benefit of an operating system or real-time kernel will require additional data sheets.

The reader should have a working knowledge of VMEbus and PCI local bus standards, as well as Ethernet and SATA specifications.

Unpacking

Caution: The XV1 contains statically sensitive components. Industry-standard antistatic measures must be observed when removing the XV1 from its shipping container and during any subsequent handling. A wrist strap provides grounding for static electricity between your body and the chassis of the system unit.

Remove the XV1 and accessories from the shipping container and check the contents against the packing list. Be certain to observe industry-standard ESD protection procedures when handling static-sensitive components. The package should include all elements of your order. Also, please check to verify all jumper pins and solder beads are configured correctly.

Please report any shipping discrepancies to the Themis Computer Customer Support group immediately: support@themis.com or 1-510-252-0870.

For Repackaging of your XV1, please refer to Appendix F, “Repackaging Instructions” of the manual.

Chapter Overview

The chapters and appendices of this manual are briefly outlined as follows:

- Chapter 1, "XV1 Installation" provides instructions on the installation and configuration of the XV1 for your particular environment and application.

Note: The information contained in Chapter 1 is **mandatory** to understand and configure the correct operation of the XV1. This chapter should be read in its entirety.

- Chapter 2, "XV1 Features and Specifications" provides a brief overview of the XV1, along with its System, Environmental, and Power specifications.
- Chapter 3, "Hardware Overview" describes the major components installed on the XV1.
- Appendix A, “Connector Pinouts and Signal Descriptions” provides part numbers, pinouts, and signal descriptions for the I/O connectors on the XV1 Baseboard, Paddle Board, and FPIO-Expansion Board.
- Appendix B, "Jumper Pins and Solder Beads" provides a detailed description and default configuration of each of the jumper pins and solder beads on the XV1, as well as diagrams illustrating their location on the PCB.

Note: Appendix B should be consulted to verify that the jumper pins and solder beads on your system are set to meet your application requirements.

- Appendix C, “Front-Panel I/O Connections and LEDs” illustrates the front panels for all model configurations of the XV1.
- Appendix D, “Board Component and Connector Diagrams” provides descriptions of the major components and connectors of the XV1 Baseboard, Paddle Board, and FPIO-Expansion Board.
- Appendix E, “VME Slot Configurations” illustrates the various model configurations used by the XV1.

Notes, Cautions, Warnings, and Sidebars

The following icons and formatted text are included in this document for the reasons described:

Note: A note provides additional information concerning the procedure or action being described.

Caution: A caution describes a procedure or action that may result in damage to the equipment. This may involve—but is not restricted to—heavy equipment or sharp objects. To reduce the risk, follow the instructions accompanying this symbol.

Warning: A warning describes a procedure or action that may cause injury or death to the operator. To reduce the risk, follow the instructions accompanying this symbol.

Sidebar: A "sidebar" adds detail to the section within which it is placed, but is not absolutely vital to the description or procedure of the section.

Website Information

Themis Computer corporate and product information may be accessed on the World Wide Web by going to: http://www.themis.com.

The Sales & Marketing Department may be reached at info@themis.com.

Product Warranty and Registration

Please review the Themis Computer warranty and complete the product registration card delivered with your XV1 board(s). Return of the registration card is not required to activate your product warranty but, by registering your XV1, Themis Computer will be better able to provide you with timely information updates and product-enhancement notifications.

Our Customer Support department is committed to providing the best product support in the computer industry. Customer support is available 8am—5pm (PST), Monday through Friday, via telephone, fax, e-mail, and our website.

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In Case Of Difficulties

If the XV1 does not behave as described or if you encounter difficulties installing or configuring the board, please call Themis Computer technical support at +1 (510) 252-0870, fax your questions to +1 (510) 490-5529, or e-mail to *support@themis.com*. You can also contact us via our web site: http://www.themis.com.

Your Comments are Welcome

We are interested in improving our documentation and welcome your comments and suggestions. You can email your comments to us at **docfeedback@themis.com**. Please include the document part number (116704-022) in the subject line of your email.

Installation Section

Chapter 1

XV1 Installation

1.1 Determine Board Type

The Themis XV1 single-board computer is available in three model configurations, as defined in *Table 1* on page xix of the Preface chapter.

To determine your Baseboard type and configuration, check the white sticker located near your Baseboard's VME P2 connector. It contains information on board type and revision, memory allocation, CPU speed, serial number, and Ethernet addresses (either one or three). For example:

Themis [XV1/2-4096-2130-CC A1] [P13007860]

ETHERNET [00 80 B6 04 70 F6] [00 80 B6 04 70 F7] [00 80 B6 04 70 F8]

which is interpreted as follows:

- *Board Type (Model):* **XV1/2**
- *SDRAM:* **4096 MBytes**
- *CPU Frequency:* **2130 MHz**
- *Production Information:* **CC (Conformal Coating)**
- *Revision:* **A1**
- *Serial Number:* **P13007860**

- *Ethernet Address(es):* **00 80 B6 04 70 F6**, **00 80 B6 04 70 F7,** and **00 80 B6 04 70 F8**

To install the XV1, a standard VME chassis with J1/J2 backplane (3-row or 5-row connector) is required.

1.2 Check Configurations

When you first receive the XV1, confirm that the jumper-pin and solder-bead configurations are appropriate for your application. Appendix B, ”Jumper Pins and Solder Beads” gives detailed information regarding jumper-pins and solder beads, including default settings. Solder-bead settings are set by Themis at the factory before shipping and should only be changed by Themis at the factory.

Warning: Attempting to alter a solder-bead configuration could seriously damage the XV1. DO NOT ATTEMPT TO ALTER SOLDER-BEAD CONFIGURATIONS. Instead, contact Themis to change any settings.

1.3 Install the Paddle Board

Caution: Some pins on the P2 connector of the XV1 are used to provide a mandatory input supply voltage (either +12V or +5V) that is required to operate the XV1. Therefore, the XV1 Paddle Card must be installed for operation of the XV1 unless some other means of delivering power to these pins is devised (*i.e.*, the 6-pin power connector on the RTM (Rear Transition Module, which is used in conjunction with the FPIO-Expansion Board).

The XV1 Paddle Board attaches to the rear of the P2 slot occupied by the XV1 Baseboard on the VME backplane (see *Figure 1-1* on page 1-4). When attaching the paddle card, a 5-row paddle card must be plugged into a 5-row VME backplane, and as such, a 3-row paddle card must be plugged into a 3-row VME backplane. Paddle cards must be consistent with the backplane type.

The connections provided by the XV1 Paddle Board are described in *Table 1-1* on page 1-5. A pinout and signal description of each I/O connector of the Paddle Board is given in Appendix A, “Connector Pinouts and Signal Descriptions”.

Warning: Plug the XV1 Paddle Board into the **P2 connector backplane only**. If inserted into the P1 connector, it will cause damage to the Paddle Board and the XV1.

The Themis paddle board is intended as a development tool and is not recommended for production assemblies. Please contact Themis for available production level options.

Such available options include the FPIO-Expansion Board which is mentioned throughout this manual.

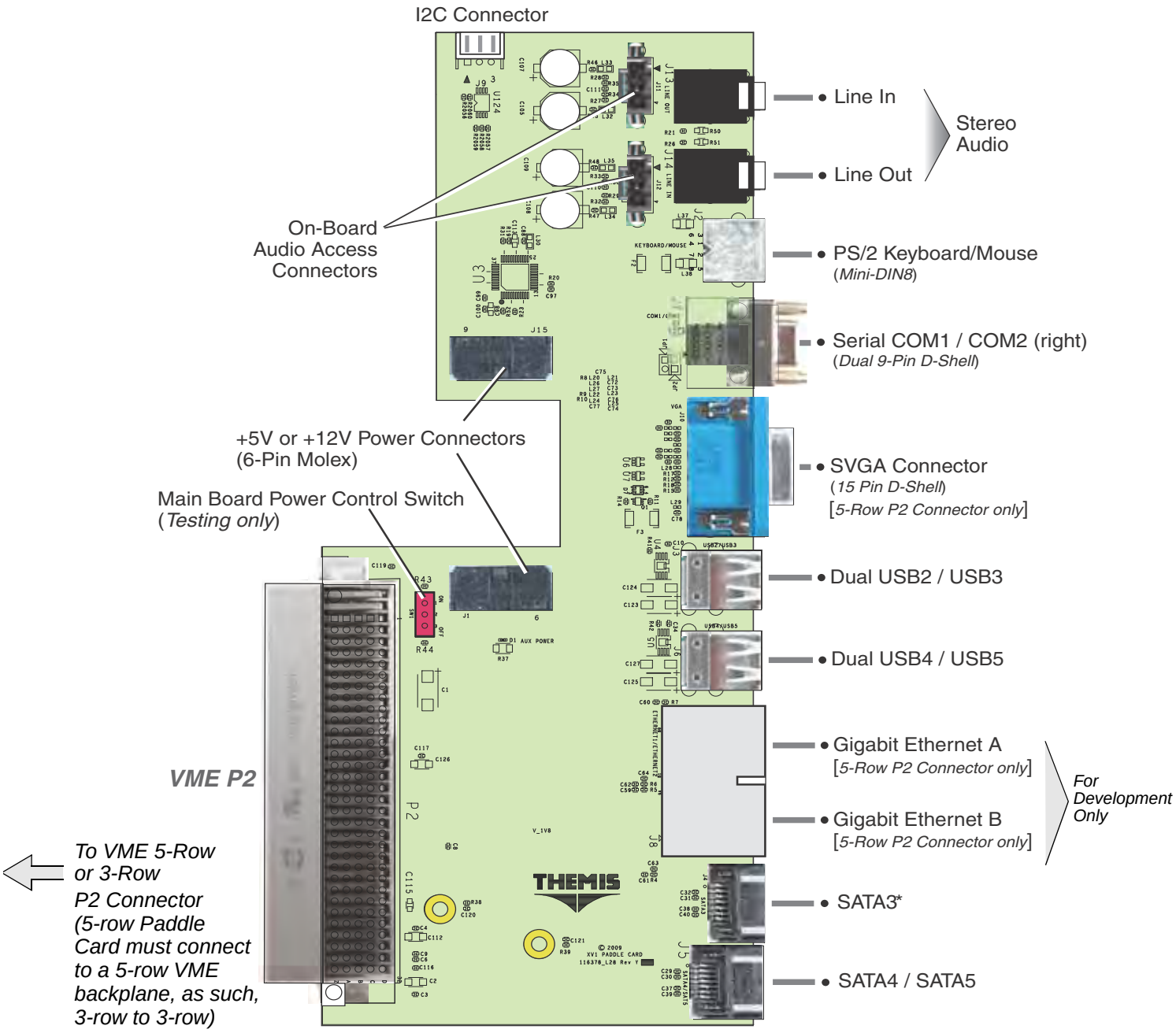


Figure 1-1. Paddle Board Component and Connector Diagram (Top Side)

Table 1-1. XV1 P2 Paddle Board I/O Connections

Connections	Definition	3-Row P2	5-Row P2
1 SVGA monitor port	Super VGA video support (5-row only)	**No**	Yes
4 USB ports	USB2 / USB3 and USB4 / USB5	Yes	Yes
1 PS/2 keyboard/mouse port	Mini-DIN8 connector (split-cable 110104-002 is required to attached a keyboard and a mouse)	Yes	Yes
2 serial ports	COM1[a] [b](full modem support); COM2[b] (Tx/Rx only)	Yes	Yes
Stereo audio input/output	HDA line-in/line-out	Yes	Yes
2 or 3 SATA Ports	SATA4 and SATA5; SATA3[b] is optional (FP or P2)	Yes	Yes
2 gigabit Ethernet ports	Dual gigabit Ethernet	**No**	Yes
+12V and +5V power	Through two 6-pin Molex connectors (use power cable P/N 111230-001 to connect)	Yes	Yes

a—COM1 provides full modem support only through a 5-row VME P2 Backplane; if the Paddle Board is attached to a 3-row backplane, only transmit and receive signals—Tx and Rx—are supported (see *Table A-2*, page A-4, in Appendix A, "Connector Pinouts and Signal Descriptions").

b—COM1, COM2, and SATA3 may be routed to the front panel or P2. Desired option must be mentioned at time of purchase.

If you have installed a Paddle Board, go to the sections that follow to attach the appropriate cables to the connectors you will be using. Themis provides most of these cables in the Integration Kit shipped with the XV1 (see *Table 1-2* bellow).

Table 1-2. XV1 Integration Kit (Order-Dependent)

Qty	Description	Part Number	Kit	Where Used
1	XV1 Paddle Board, 5-Row	116378-L01	001	5-row P2 Connector
1	XV1 Paddle Board, 3-Row	116378-L02	002	3-row P2 Connector
1	Cable, Multiple-I/O Connector (60 pins)	116667-L01	All	XV1 Front Panel
1	Cable, Serial, RS232 (Mini-DB9-M to DB25-M)	108113-06	Only one cable required	Paddle Board (Non-Null Modem Cable)
1	Cable, Serial, RS232 (Mini-DB9-M to DB9-F) Cable, Serial, RS232 (Mini-DB9-M to DB9-F)	108113-08 113057-001		Paddle Board (Null Modem Cable)
1	*Special Split Pigtail Cable*—8-pin mini-DIN to 6-pin Keyboard DIN and 6-pin Mouse DIN	110104-002	All	Paddle Board
2	Cable, Power	111230-001	All	Paddle Board

1.4 Install the FPIO-Expansion Board

The FPIO-Expansion Board (PN:117803-L01) attaches to the slot 3 VME backplane connectors in the chassis and is routed to the XV1 baseboard through the use of the RTM (Rear Transition Module)(PN:117802-L01). The RTM attaches to the rear of the VME P2 connectors of slot 1 and slot 3, thus joining the XV1 baseboard with the FPIO-Expansion Board. In this way, the signals from the front panel on the expansion board are transferred to and from the XV1 unit.The FPIO-Expansion Board and RTM install as seen in *Figure 1-2* below.

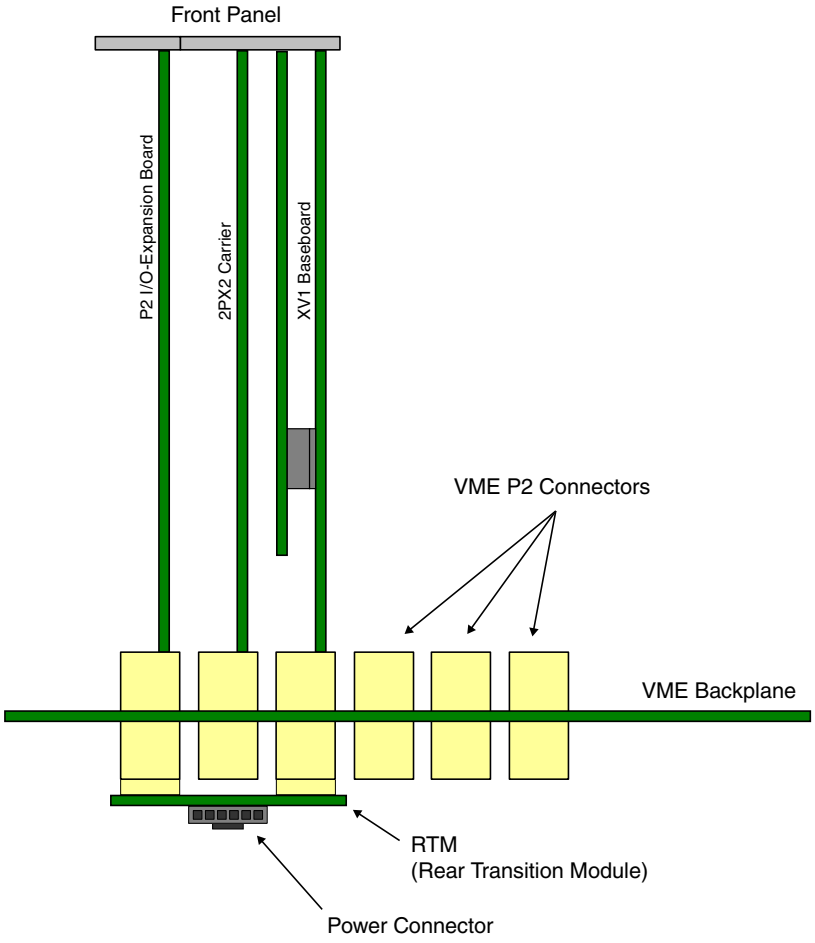


Figure 1-2. FPIO-Expansion Board and RTM Configuration

The FPIO-Expansion Board can be seen in greater detail in Chapter 2, "XV1 Features and Specifications" along with the RTM (page 2-6, and page 2-8).

1.5 Attach Front-Panel I/O Cables

To connect the XV1 to peripheral devices and networks, you must attach the proper I/O cables to the appropriate Front Panel and VME P2 Paddle Board connectors. The following sections provide information on what cables are required and how to attach them. Refer to Appendix A, “Connector Pinouts and Signal Descriptions” for connector pinouts and signal descriptions, as well as Appendix C, “Front-Panel I/O Connections and LEDs”.

Table 1-3 lists the I/O connections that can be attached to the XV1 Front Panel.

Table 1-3. XV1 Front-Panel I/O Connections

Connections	Definition
1 LAN port (RJ45)	Gigabit Ethernet C (connected to the 82574 PHY)
Multiple-I/O Connector Ports	
—2 USB ports	USB0 and USB1, both with Keyboard/Mouse support
—2 Serial ports	COM1[a] (Modem Support) and COM2[a] (Transmit/Receive only)
—1 SATA port	SATA3[a]
—1 SVGA graphics port	
1 PMC/XMC Module	I/O cabling dependent on the PMC/XMC card installed

a—COM1, COM2, and SATA3 may be routed to the front panel or P2. Desired option must be mentioned at time of purchase.

1.5.1 Gigabit Ethernet Port C

The XV1 features one RJ45 connector (with two status LEDs and an embedded transformer) on the Front Panel (Gigabit Ethernet Port C) for a 10/100/1000Base-T Ethernet interface connection.

Use a standard RJ45 cable to connect to an external network. After attaching the XV1 to a network through Ethernet C, you can verify if a proper physical connection has been made by executing the proper network command.

1.5.2 Multiple-I/O Connector Ports

Connect the multiple-I/O connector cable (P/N 116667-L01; see *Figure A-4*, page A-6, in Appendix A, “Connector Pinouts and Signal Descriptions”) to the multiple-I/O connector on the XV1 Front Panel, securing the cable with attached thumb screws. At the other end, connect each of the supported I/O connectors listed in *Table 1-3*.

1.6 Attach Paddle-Board Cables

It is important that the auxiliary +12V, or +5V power cable(s) also be connected to chassis (rack) power to provide the appropriate voltage to support higher power levels required by the XV1.

[Go to Section 1.6.7, “Auxiliary +12V/+5V Power Connectors,” on page 1-9 for more information.]

1.6.1 Serial Ports COM1 and COM2

Serial Port COM1 provides full modem support (5-row VME P2 backplane only); COM 2 supports Tx/Rx signals only. Depending on the system requirements (see Appendix A, “Connector Pinouts and Signal Descriptions”), COM1 and COM2 are both available from either the Front Panel or a Paddle Board attached to the VME P2 connector. Location of the Serial Ports must be decided at time of purchase.

Connect the appropriate cable (P/N P/N-108113-06) to either COM1 or COM2.

[A pinout of COM1/COM2 is given in *Figure A-7* on page A-13 of Appendix A, with signal descriptions described in *Table A-8*, page A-14.]

1.6.2 PS/2 Keyboard & Mouse

Connect the special Splitter Cable (8-pin mini-DIN to 6-pin Keyboard DIN and 6-pin Mouse DIN; P/N 110104-002) to the PS/2 Keyboard/Mouse port on the Paddle Board. Connect the keyboard to the longer of the two split cables. Connect the mouse to the shorter split cable.

[A pinout of the PS/2 Keyboard/Mouse is given in *Figure A-8* on page A-14 of Appendix A, with signal descriptions described in *Table A-9*, page A-14.]

1.6.3 USB Ports 2, 3, 4, and 5

Connect a standard USB 2.0 cable to any of the four USB ports on the Paddle Board.

[A pinout of USB Ports 2, 3, 4, and 5 is given in *Figure A-9* on page A-15 of Appendix A, with signal descriptions described in *Table A-10*, page A-15.]

1.6.4 SVGA Video Port

Attach one end of a standard 15-pin (3 rows x 5) display cable to the video port on the Paddle Board (requires a 5-row P2 connector) and the other end to an SVGA display. [A pinout of the SVGA connector is given in *Figure A-10* on page A-15 of Appendix A, with signal descriptions described in *Table A-11*, page A-16.]

1.6.5 SATA Ports 3, 4, and 5

Attach a standard SATA connector cable to any of the three SATA ports on the Paddle Board. Attach the other end to the desired device. SATA3 may be routed to the front panel or P2, and must be specified at time of purchase.

1.6.6 Stereo Audio I/O Connectors

To establish a stereo audio I/O connection, attach a standard mini-audio plug (3.5 mm) to the line-in and line-out audio jacks of the Paddle Board.

1.6.7 Auxiliary +12V/+5V Power Connectors

Caution: Your XV1 requires the installation of auxiliary power cable(s) to the Paddle Board from a +12V or +5V source on the chassis (rack). The XV1 will not operate without the auxiliary power connection.

The user has the option of providing either +12 volts or +5 volts to the XV1 to supplement the voltage supply provided through the VME backplane. Either voltage option is sufficient to operate the XV1 at maximum performance. For typical power requirements, see *Table 2-11*, page 2-17, in Chapter 2, "XV1 Features and Specifications". [A pinout of the power connector is given in *Figure A-12* on page A-18 of Appendix A, with signal descriptions described in *Table A-13*, page A-18.]

1.6.7.1 +12V Power Connector

Connect **only one** power cable (P/N 111230-001) to either one of the 6-pin power connectors (J1 or J15) on the Paddle Board. Connect the other end of the power cable to the appropriate +12-volt voltage source of the rack power supply.

1.6.7.2 +5V Power Connectors

Connect **both** power cables (P/N 111230-001) to each of the 6-pin power connectors

(J1 and J15) on the Paddle Board. Connect the other end of each power cable to the appropriate +5-volt voltage source of the rack power supply.

When connecting power to the XV1, **DO NOT** mix +5V and +12V power input. Both power connections must be of the same voltage for the XV1 to function properly.

1.7 Attach FPIO-Expansion Board and RTM Cables

It is important that the auxiliary +12V (+5V not recommended) power cable also be connected to chassis (rack) power to provide the appropriate voltage to support higher power levels required by the XV1.

[Go to Section 1.6.7, “Auxiliary +12V/+5V Power Connectors,” on page 1-9 for more information.]

1.7.1 PS/2 Keyboard & Mouse

Connect a 6-pin mini-DIN Cable to the PS/2 Keyboard/Mouse ports on the FPIO-Expansion Board.

[A pinout of the PS/2 Keyboard/Mouse is given in *Table A-14* on page A-20 of Appendix A, with signal descriptions described in *Table A-14*, page A-20.]

1.7.2 USB Ports A, B, C, and D

Connect a standard USB 2.0 cable to any of the four USB ports on the FPIO-Expansion Board.

[A pinout of the USB Ports can be referenced in *Figure A-9* on page A-15 of Appendix A, with signal descriptions described in *Table A-10*, page A-15.]

1.7.3 SATA Ports A, and B

Attach a standard SATA connector cable to any of the two SATA ports on the FPIO-Expansion Board. Attach the other end to the desired device.

1.7.4 Stereo Audio I/O Connectors

To establish a stereo audio I/O connection, attach a standard mini-audio plug (3.5 mm) to the line-in and line-out audio jacks of the FPIO-Expansion Board.

1.7.5 Auxiliary +12V/+5V Power Connectors

Caution: Your XV1 requires the installation of an auxiliary power cable to the RTM from a +12V (+5V not recommended) source on the chassis (rack). The XV1 will not operate without the auxiliary power connection.

1.7.5.1 +12V Power Connector

Connect **only one** power cable (P/N 111230-001) to the 6-pin power connector (J1) on the RTM. Connect the other end of the power cable to the appropriate +12-volt voltage source of the rack power supply.

1.7.5.2 +5V Power Connectors

Connect the power cable (P/N 111230-001) to the 6-pin power connector (J1) on the RTM. Connect the other end of each power cable to the appropriate +5-volt voltage source of the rack power supply (*see notes below*).

When connecting power to the XV1, **DO NOT** mix +5V and +12V power input. Both power connections must be of the same voltage for the XV1 to function properly.

Although the FPIO-Expansion Board and RTM will function with a +5V power source, it is highly recommended connecting to a +12V power source when using the FPIO-Expansion Board and RTM.

1.8 Daisy-Chain Jumper Settings

In compliance with the VME Specification, any VME-based PMC/XMC Carrier Board assures the backplane continuity between bus grants BG[0.3]IN to BG[0..3]OUT, and the interrupt acknowledge daisy-chain IACKIN to IACKOUT.

1.9 TOD/NVRAM Battery

The XV1 has its own lithium battery (3V; CR2032) to operate the TOD clock and maintain the contents of the NVRAM during a power shutdown. Located directly on the top surface of the PCB, the battery provides power backup for approximately three (3) years.

To remove the battery (see *Figure 1-3* on page 1-12), carefully slide it past the opening in the holder until it is free. When replacing the battery, make sure the plus (+) side is facing toward you.

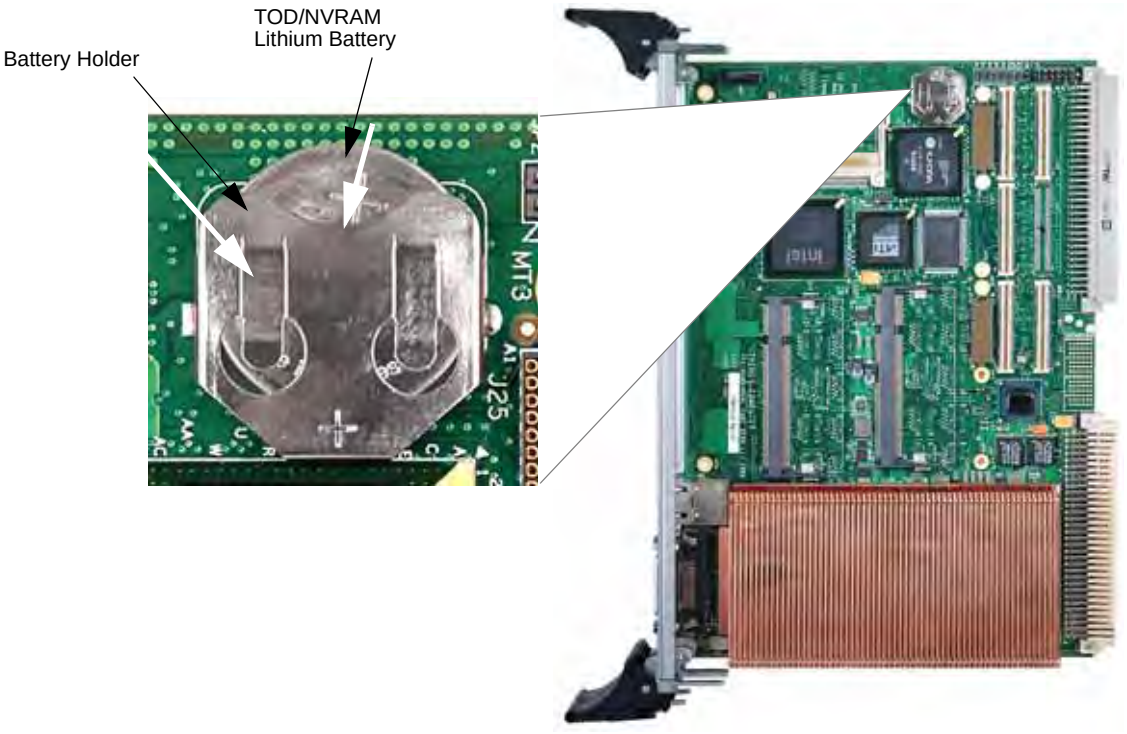


Figure 1-3. Location of the TOD/NVRAM Battery

1.9.1 Post Battery Replacement

Upon removing the 3V lithium battery, all BIOS configurations and TOD Clock information will be lost. When the XV1 is powered back up after the battery replacement has taken place, Default BIOS settings will load along with default TOD Clock information.

1.9.1.1 Reconfigure BIOS Settings

Unless specified otherwise, your XV1 leaves Themis with the BIOS configurations set to Optimal Defaults <F9>. If you have requested specific BIOS configurations, Themis enters these configurations after loading optimal defaults. As such, it is recommended that you first load optimal defaults, then make changes as necessary to the BIOS configurations.

1.10 Inserting and Removing the XV1

Inserting the XV1 into the chassis and likewise, removing the XV1 from the chassis is a simple process. Although the process is not complicated, simple precautions should be followed to help prevent damage to the XV1, or chassis components.

When inserting and removing the XV1, these precautions should be taken:

- Use care when inserting the XV1 into the chassis as not to impact and damage any of the components on the backside.
- With a carrier board installed, the entire assembly may require some additional force to install. This additional force is perfectly normal, being mindful that everything is aligned properly.
- If there is any resistance do not force the unit and stop. Make sure the PCB is properly aligned on the VME rails and that there are no obstructions preventing proper insertion.
- Make sure the set screws on the handle are properly adjusted allowing for a full range of motion in the ejector handles.

If necessary, please contact themis support (support@themis.com) for further assistance regarding the physical installation of your XV1.

Specification Section

Chapter 2

XV1 Features and Specifications

2.1 Baseboard

The XV1 was designed to provide a low-power Intel quad-core Xeon CPU platform in a standard single-slot, 6RU high, VME64 form factor. The XV1 is implemented as a VMEbus board with CPU support consisting of the Intel 5100 MCH and 82801 ICHR9 chipset, supporting PCI and PCI-Express expansion capabilities (see *Figure 2-1*, page 2-2). On-board PMC/XMC sites (1, 2, or 3, depending on the model) allow I/O expansion for graphics and general I/O. The XMC connectors can also be used to extend I/O capability via an I/O Expansion Board (model XV1/3 only).

Basic features of the XV1 include:

- One Intel quad-core 2.13-GHz Xeon Processor
- Up to 4 GB DDR2 onboard memory and 4 GB SOR-DIMM memory modules (for a total of 8 GB of memory)
- Tsi148 VME64x interface
- VITA 41 VXS.3 compliant interface to GbE VXS switched fabric
- PCI and PCI-Express expansion capabilities via the two PMC/XMC Module Slots (64 bit/66 MHz & 32 bit/33MHz)
- AMI BIOS
- Battery Backup for TOD/NVRAM
- Front-Panel System LEDs
- Front-Panel I/O ports / Multiple I/O ports through rear VME P2 connector

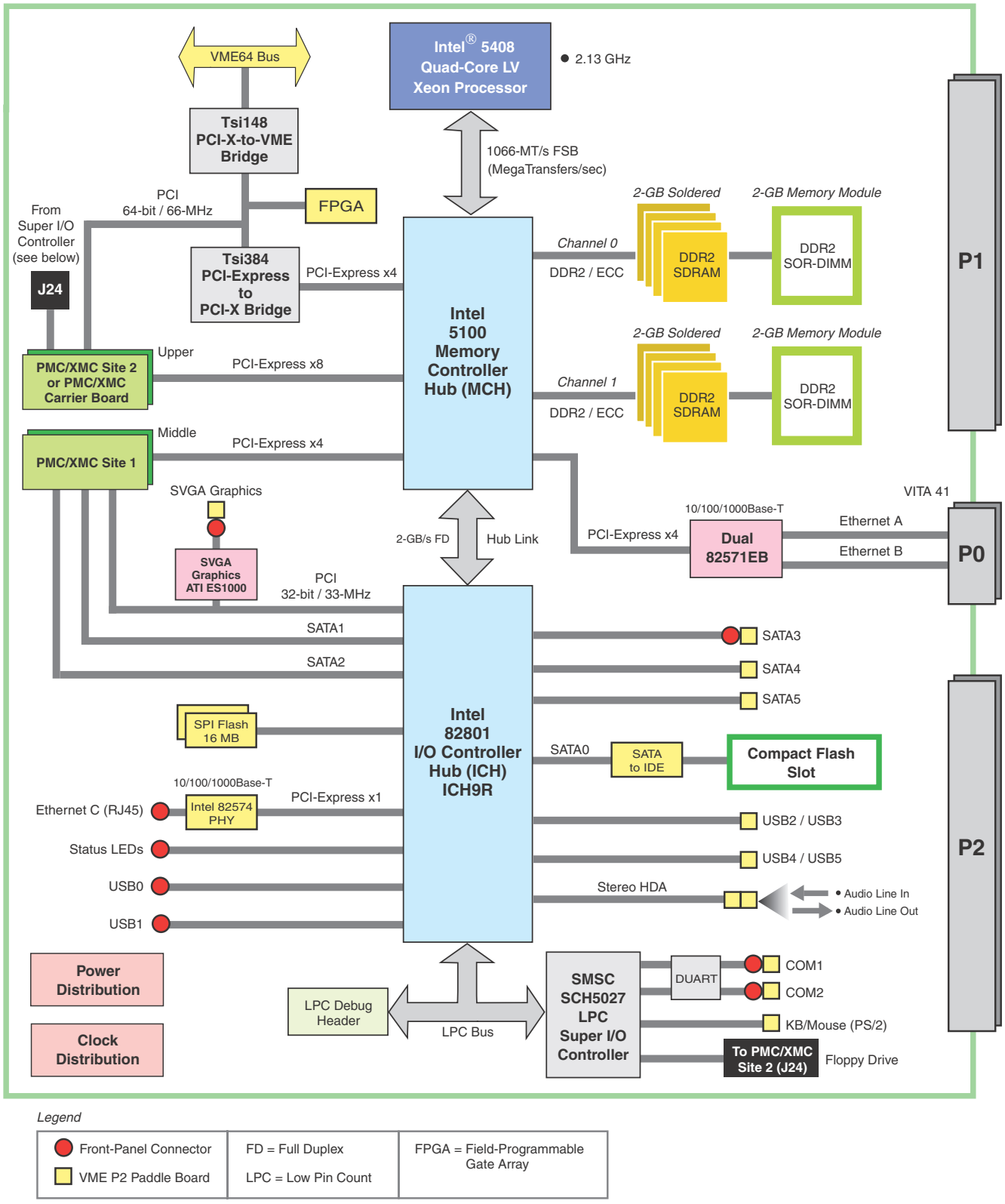


Figure 2-1. XV1 Block Diagram

The XV1 Front Panel I/O connectors and LEDs are described in *Table 2-1*.

Table 2-1. XV1 Front-Panel I/O Connections

Connections	Definition
1 LAN port (RJ45)	Gigabit Ethernet C
Multiple-I/O Connector Ports	
—2 USB ports	USB0 and USB1, both with Keyboard/Mouse support
—2 Serial ports	COM1 (Modem Support) and COM2 (Transmit/Receive only)
—1 SATA port	SATA3 (as a manufacturing option specified at time of order)
—1 SVGA graphics port	
2[a] PMC/XMC Module	I/O cabling dependent on the PMC/XMC card installed

a—This number changes to 1 if a carrier board is installed.

Front-Panel connector pinouts and signal definitions are defined in Appendix A, “Connector Pinouts and Signal Descriptions”.

The XV1 provides a VITA 41 interface that offers the capability to connect to a VME data plane using a GbE switched fabric (VITA 41.3, VXS.3).

The XV1 supports up to 8 GB (GigaBytes) of memory—4 GB directly soldered to the bottom side of the XV1 baseboard, and 4 GB evenly divided between two small-outline dual in-line memory modules (SOR-DIMMs)—thereby supporting several memory configurations (see *Table 2-2*). All memory is divided into two channels: Channel 0 and Channel 1 (see *Figure 2-1* on page 2-2).

Note: The size and type of XV1 memory should be specified at the time of your order. SOR-DIMMs must be Themis-qualified and registered.

Table 2-2. XV1 Memory Configurations

Total Memory Size	On-Board (Soldered) DDR2 SDRAM		DDR2 SOR-DIMM Memory Module (1 GB or 2 GB each)	
	Channel 0	Channel 1	Channel 0	Channel 1
2 GB	1 GB	1 GB	0	0
4 GB	1 GB	1 GB	1 GB	1 GB
4 GB	2 GB	2 GB	0	0
6 GB	2 GB	2 GB	1 GB	1 GB
8 GB	2 GB	2 GB	2 GB	2 GB

2.2 PMC/XMC Cards

The XV1 has a built-in graphics support in the form of an ATI ES1000 2D graphics accelerator, accessed through SVGA monitor ports on both the Front Panel and the Paddle Board. For higher-performance graphics support, it is recommended that the user install a Themis TGA-7000 PMC Graphics Card, or T2GPX XMC Graphics Card in one of the PMC/XMC Module slots within the system (the XV1 baseboard itself or its I/O Expansion Board).

Caution: In order to install a PMC/XMC Module such as the TGA-7000 PMC Graphics Card, the on-board ES1000 graphics accelerator should first be disabled by installing a jumper at JP7 (see *Table B-1*, page B-2, in Appendix B, "Jumper Pins and Solder Beads".

For more information on the TGA-7000, consult the *TGA-7000 PMC Graphics Card Installation Guide*, Themis P/N 112874-021. For the T2GPX, consult the *T2GPX XMC Graphics Card Installation Manual*, Themis P/N 118973-024

2.3 Paddle Board

A Paddle Board is available for the XV1 that provides power to the XV1 and allows access to the I/O and other signals of the VME P2 backplane by plugging into the P2 slot directly behind the XV1. Paddle-Board connectors are described in *Table 2-3*

Table 2-3. XV1 P2 Paddle Board I/O Connections

Connections	Definition	3-Row P2	5-Row P2
1 SVGA monitor port	Super VGA video support (5-row only)	**No**	Yes
4 USB ports	USB2 / USB3 and USB4 / USB5	Yes	Yes
1 PS/2 keyboard/mouse port	Mini-DIN8 connector (split-cable 110104-002 is required to attached a keyboard and a mouse)	Yes	Yes
2 serial ports	COM1[a] [b](full modem support); COM2 (Tx/Rx only)	Yes	Yes
Stereo audio input/output	HDA line-in/line-out	Yes	Yes
3 SATA ports	SATA4 and SATA5; SATA3[b] is Front Panel or P2	Yes	Yes
2 gigabit Ethernet ports	Dual gigabit Ethernet	**No**	Yes
+12V and +5V power	Through two 6-pin Molex connectors	Yes	Yes

a—COM1 provides full modem support only through a 5-row VME P2 Backplane; if the Paddle Board is attached to a 3-row backplane, only transmit and receive signals—Tx and Rx—are supported (see *Table A-2*, page A-4, in Appendix A, "Connector Pinouts and Signal Descriptions").

b—COM1, COM2, and SATA3 may be routed to the front panel or P2. Desired option must be mentioned at time of purchase.

Paddle Board connector pinouts and signal definitions are defined in Appendix A, “Connector Pinouts and Signal Descriptions”.

Note: The Themis paddle board is intended as a development tool and is not recommended for production assemblies. Please contact Themis for available production level options.

2.4 PMC/XMC Carrier Boards

Caution: The original Themis 2P2 PMC/XMC Carrier Board or 2P2/2P3 PMC Carrier Boards physically cannot be installed onto the XV1. A new PMC/XMC Carrier Board has been designed for the XV1 and is available. See Also, pg. XV.

2.5 I/O-Expansion Board

A PMC/XMC Carrier Board is available for the XV1 (see previous section), Model XV1/3 has been designed with an I/O-Expansion Board in the second VME slot that allows two additional PMC/XMC Modules to be installed in the system (see *Figure 2-2*). This board is only 2/3 (4RU) the length of the Baseboard in order to accommodate the 2-slot high heat sink covering 1/3 of the surface of the baseboard.

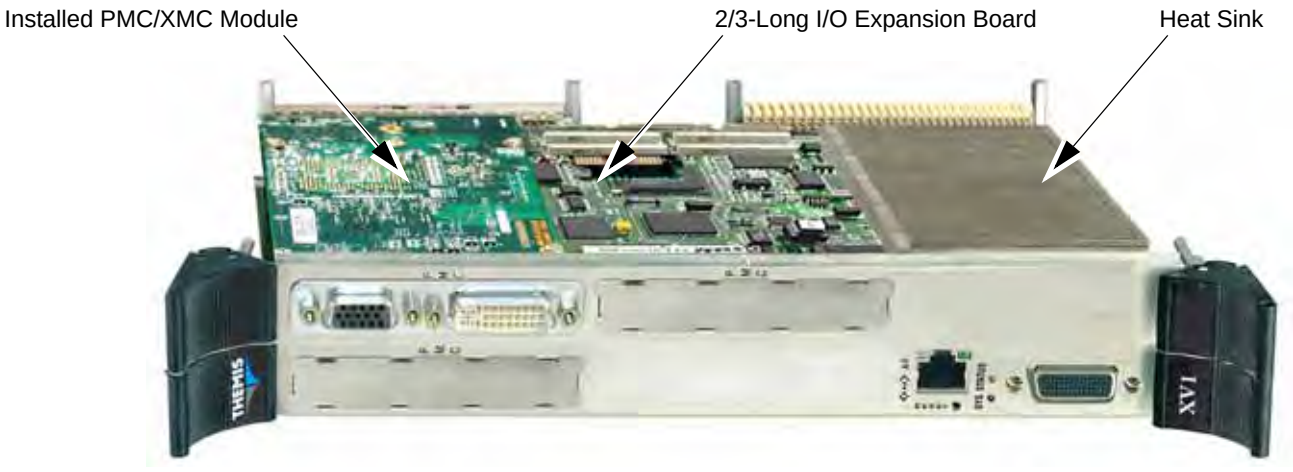


Figure 2-2. The I/O-Expansion Board on the XV1/3 Supports 2 PMC/XMC Modules

2.6 FPIO-Expansion Board

An expansion board with front panel I/O access is also available. This board is used in conjunction with the RTM (Rear Transition Module), which attaches to the rear of the VME P2 backplane. The RTM routes the VME P2 signals from the backplane in which the XV1 is connected, to the rear VME P2 backplane in which the FPIO-Expansion Board is connected. The RTM has been designed to work with 2-slot XV1 configurations so that the FPIO-Expansion Board sits directly next to the second slot on the XV1. The FPIO-Expansion Board will consume an additional slot in the chassis. The FPIO-Expansion board and RTM can be seen in *Figure 2-3* below. A block diagram for the FPIO-Expansion Board is seen in *Figure 2-4*, page 2-7

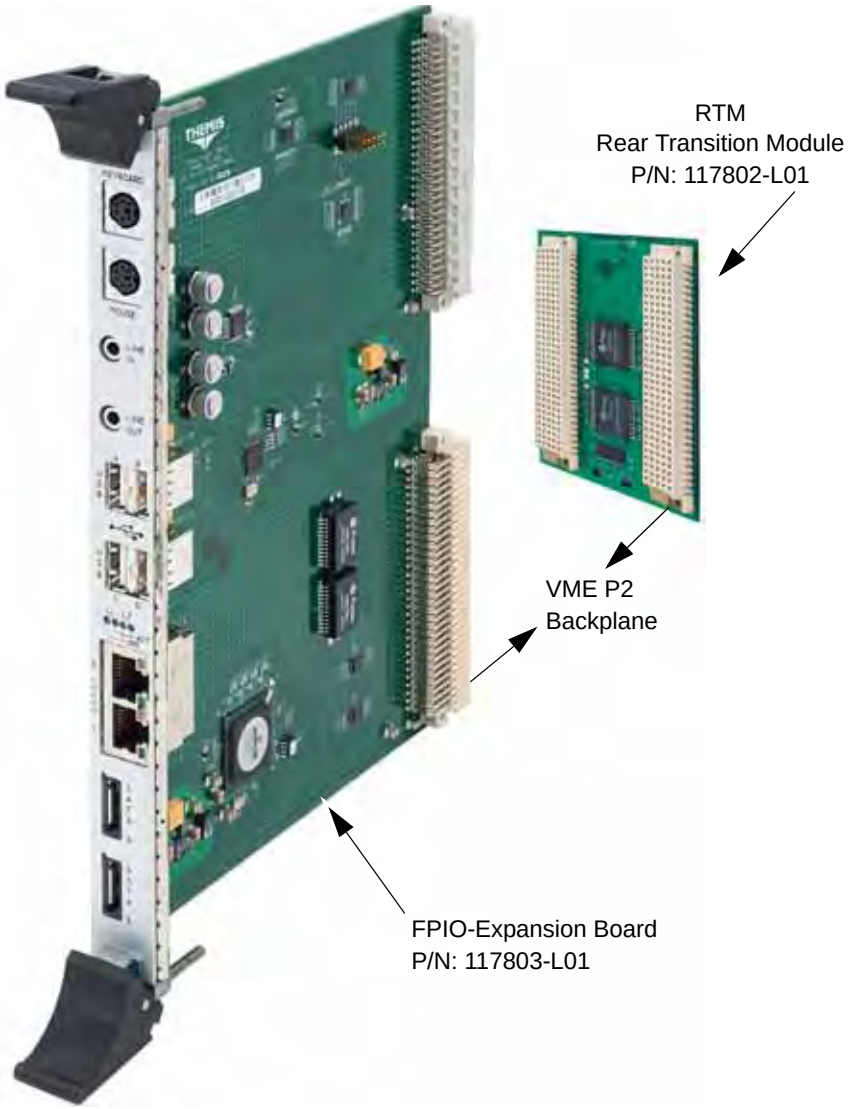


Figure 2-3. The FPIO-Expansion Board with RTM

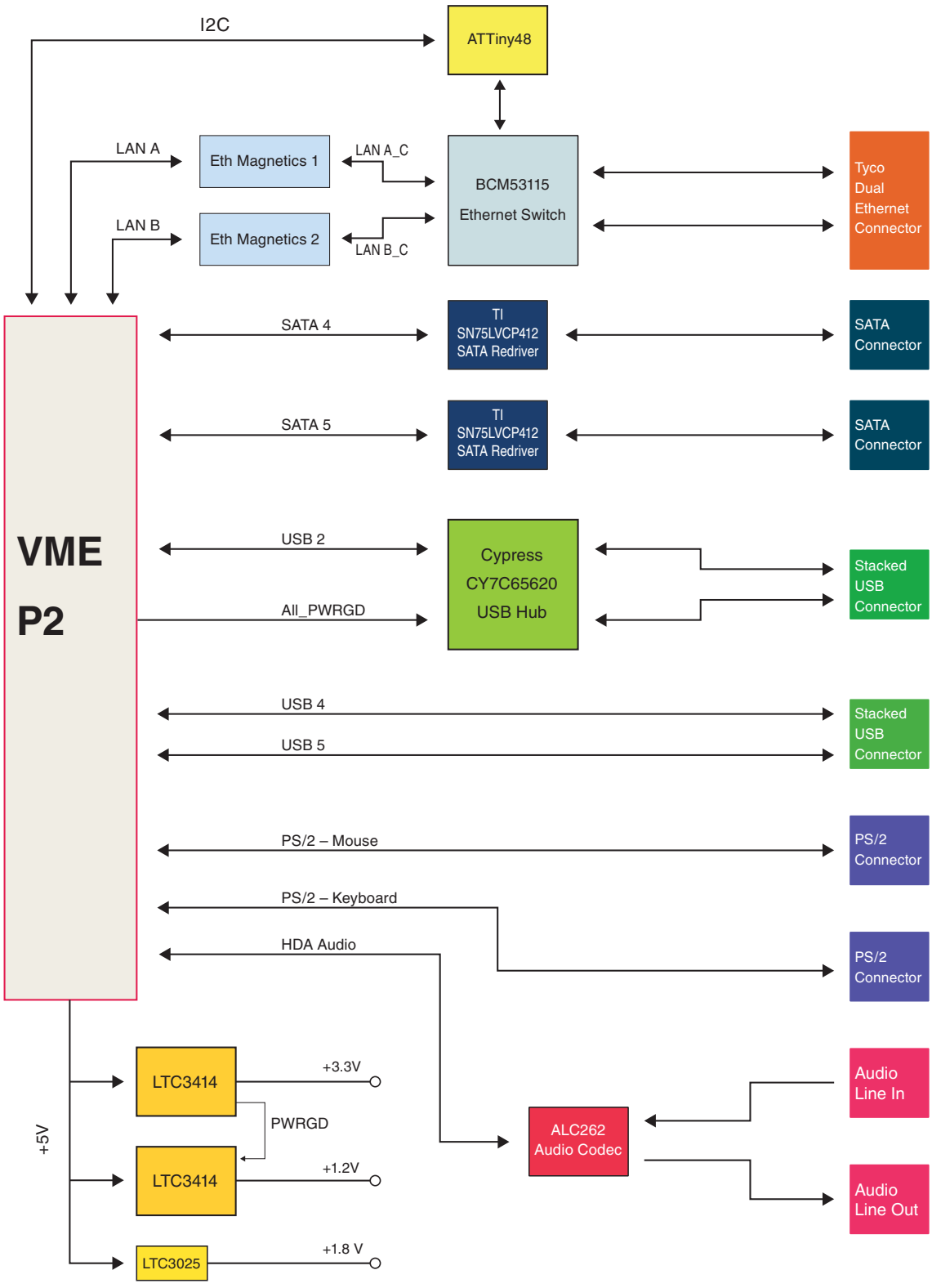


Figure 2-4. FPIO-Expansion Board Block Diagram

FPIO-Expansion Board connectors are described in *Table 2-4*. The various connections on the FPIO-Expansion Board and RTM are standard, thus the descriptions in Appendix A, “Connector Pinouts and Signal Descriptions” can be referenced for the FPIO-Expansion Board and RTM.

Table 2-4. P2 I/O-Expansion Board Connections

Connections	Definition	3-Row P2
1 PS/2 Keyboard	6-pin mini-DIN Connector for the PS/2 Keyboard	Yes
1 PS/2 Mouse	6-pin mini-DIN Connector for the PS/2 Mouse	Yes
Stereo audio input	HDA line-in (3.5mm jack)	Yes
Stereo audio output	HDA line-out (3.5mm jack)	Yes
4 USB ports	USB A / USB B and USB C / USB D	Yes
2 gigabit Ethernet ports	Dual gigabit Ethernet	Yes
2 SATA ports	SATA A and SATA B	Yes

2.6.1 RTM (Rear Transition Module)

The RTM has been exclusively designed for the FPIO-Expansion Board. The RTM attaches to the rear of the VME P2 slot occupied by the XV1 Baseboard on the VME backplane. The RTM allows the XV1 to have expanded front panel I/O capability through the use of the FPIO-Expansion Board. The RTM is a three slot wide module allowing the FPIO-Expansion Board to be placed next to a two slot XV1 configuration. A typical system configuration using a two slot XV1 in conjunction with the FPIO-Expansion Board and RTM might appear as shown below in *Figure 2-5*, page 2-9.

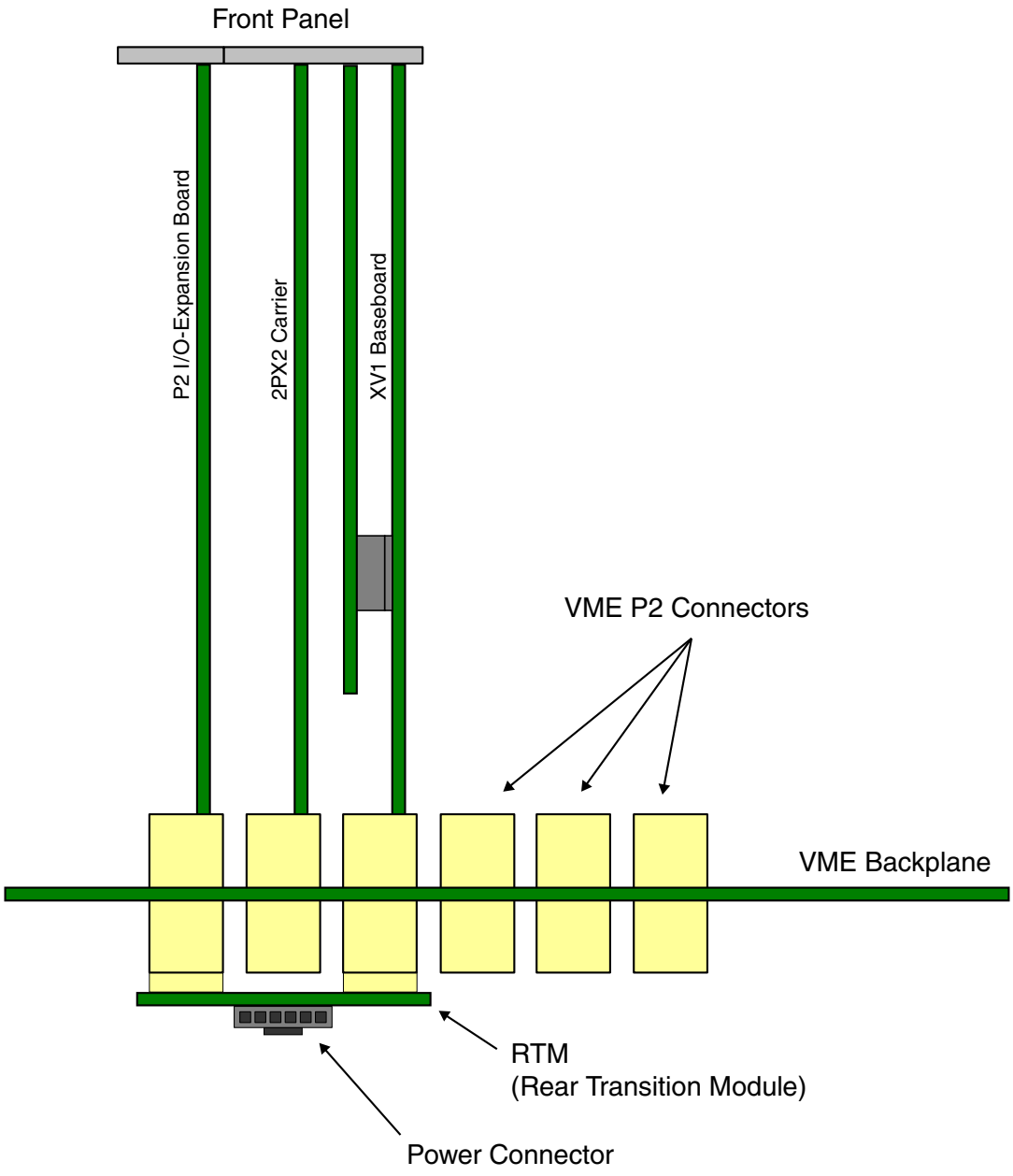


Figure 2-5. FPIO-Expansion Board and RTM Configuration

The function of the RTM is to route the VME P2 signals from the XV1 baseboard to the FPIO-Expansion Board. A block diagram of the RTM can be seen in *Figure 2-6*, page 2-10 below.

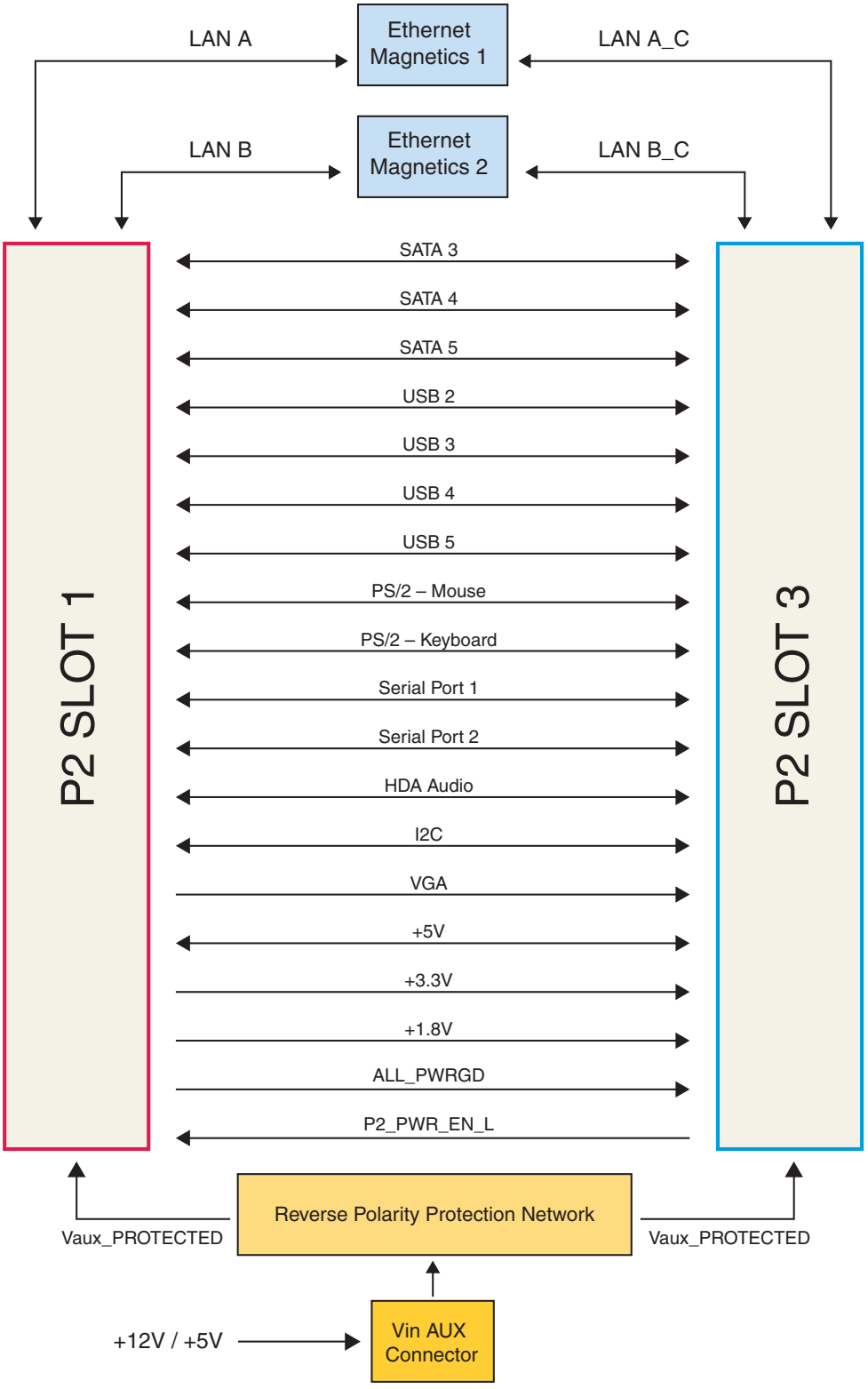


Figure 2-6. RTM Block Diagram

2.6.1.1 Optional Cover for the RTM

The VME P2 connectors on the RTM use a press fit connection to attach to the PCB. The exposed pins on the backside of the RTM could potentially pose a problem with scrapping on any cabling found on the backside of the VME backplane. As such, Themis has created an optional custom cover (117933-L01) to place over the backside of the PCB.

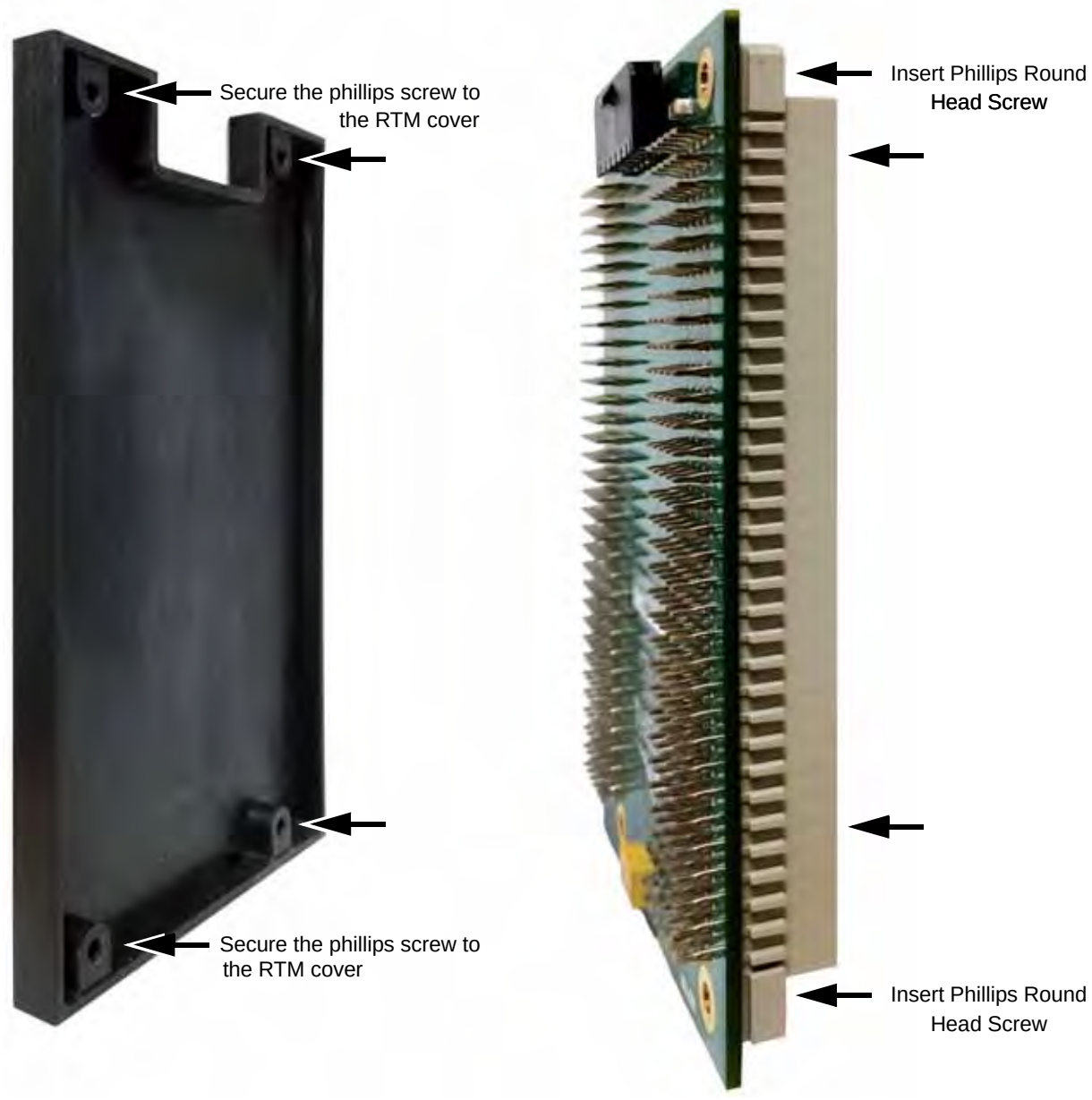

Secure the phillips screw to the RTM cover
Secure the phillips screw to the RTM cover
Insert Phillips Round Head Screw
Insert Phillips Round Head Screw

Figure 2-7. Optional Cover for the RTM

2.7 System Specifications

2.7.1 Processor and Memory Subsystems

Table 2.4 and *Table 2-6* contain processor and memory specifications, respectively.

Table 2-5. Processor Specifications

Feature/Function	Specifications
Processor	Intel Quad-Core Xeon 5408 CPU
Processor Speed	2.13 GHz
L1 Cache (Instruction + Data)	64 KB (32 KB + 32 KB)
L2 Cache	12 MB

Table 2-6. Memory Specifications

Feature/Function	Specifications
Main Memory	Total size = 8 GB (see *Table 2-2*, page 2-3)
Memory Bus Interface	72 bit Data Path from CPU, including 8 bit ECC
Memory Type (see *Table 2-2*, page 2-3)	Dual Channel, with both on-board (soldered) DDR2 SOR-DIMM memory modules

2.7.2 Operating Systems

Operating systems supported by the XV1 include Red Hat Enterprise Linux and Windows.

Note: Please contact Themis customer support for specific OS questions regarding your XV1, including current supported version of the OS and availability of drivers. You can reach Themis at support@themis.com, or by visiting http://www.themis.com.

2.7.3 I/O Subsystem

Table 2-7 lists the I/O subsystem functionality of the various XV1 configurations.

Table 2-7. XV1 I/O Subsystem Specifications

Function	Front-Panel Access			VME P2 Access (Paddle Board)
	XV1/1	XV1/2	XV1/3	
Super VGA (SVGA)	**Yes**	**Yes**	**Yes**	**Yes** [5-row P2 only]
Gigabit Ethernet C (RJ45) Auto-negotiating 10/100/1000BaseT	**Yes**	**Yes**	**Yes**	
Gigabit Ethernet A (RJ45) Auto-negotiating 10/100/1000BaseT				**Yes** [5-row P2 only][a]
Gigabit Ethernet B (RJ45) Auto-negotiating 10/100/1000BaseT				**Yes** [5-row P2 only][a]
USB0 and USB1	**Yes**	**Yes**	**Yes**	
USB2 and USB3				**Yes**
USB4 and USB5				**Yes**
PS/2 KB/Mouse				**Yes**
Serial COM1	**Yes**[b] (Tx/Rx, full modem)	**Yes**[b] (Tx/Rx, full modem)	**Yes**[b] (Tx/Rx, full modem)	**Yes**[b] (Tx/Rx, full modem[c])
Serial COM2	**Yes**[d] (Tx/Rx only)	**Yes**[d] (Tx/Rx only)	**Yes**[d] (Tx/Rx only)	**Yes**[d] (Tx/Rx only)
Stereo Audio: Line-in or Line-out				**Yes**
SATA0	• SATA0 is connected to the Compact Flash slot.			
SATA1	• SATA1 and SATA2 are connected to PMC/XMC slot 1.SATA can also be connected to the onboard SATA header as a manufacturing option.			
SATA2				
SATA3[e]	**Yes**	**Yes**	**Yes**	**Yes**
SATA4				**Yes**
SATA5				**Yes**
Floppy Drive	• Floppy-Drive signals are connected to PMC Site 2 as a manufacturing option.			

a—Ethernet A and Ethernet B are also connected to the P0 backplane connector.

b—COM1 must be configured by Themis at the time of your order to be accessed through either the Front Panel or the P2 connector, but not both. COM1 requirements are a manufacturing option and must be stated at time of purchase.

c—Full modem signals are available only when attached to a 5-row VME P2 connector.

d—COM2 must be configured by Themis at the time of your order to be accessed through either the Front Panel or the P2 connector, but not both. COM2 requirements are a manufacturing option and must be stated at time of purchase.

e—SATA3 can be accessed either through the Front Panel or the P2 Paddle Board, but not both at the same time. SATA3 requirements are a manufacturing option and must be stated at time of purchase.

2.7.4 Auxiliary Functions

Table 2-8 summarizes the functional specifications of the XV1 auxiliary functions. These specifications apply to all product configurations.

Table 2-8. Auxiliary Functions Specifications

Feature/Function	Specifications
BIOS Flash Memory	Total of 4 MB (2-MB Primary, 2-MB Backup)
NVRAM/TOD	256 Byte, battery-backed CMOS RAM plus timekeeper
System Status LEDs	Two LEDs located on Front Panel of the Baseboard [See C.2.2, “XV1/1—1 PMC/XMC Module”, page C-4, Appendix C, “Front-Panel I/O Connections and LEDs”]
Board LEDs	The are five LEDs on the PCB edge by the font panel. A small cutout has been made to the lower left side of the faceplate to allow for viewing of the five LEDs on the PCB. [See *Figure C-3* on page C-4 and *Table C-3* on page C-9 for more information]
Reset Switch	Momentary Push-button - Generates POR Located underneath baseboard left of the Front Panel
Watchdog Timers	Two Level Watchdog: Level One: Interrupt Level Two: POR Reset
Voltage Sensors	Monitors all internally generated voltages POR reset signal is generated when voltage is out of tolerance POR voltage Environmental monitoring: all internally generated voltages (backplane)
Temperature Sensors	Monitors CPU and the Memory Controller temperature

2.7.5 System Controller vs Non-System Controller Local-to-VME Resets

Local-to-VME resets are handled differently depending on whether the board is configured as the system controller or the non-system controller (see JP8 and SB7 in *Table B-1* on page B-2, and *Table B-3* on page B-5). These differences are as listed in the sections below.

2.7.5.1 Non-System Controller Local-to-VME Resets

A local reset on a XV1 configured to be a non-System Controller will **not** result in a reset to the VME backplane. The only way that an XV1 configured as a non-system controller can send out a VME reset is by setting the SRESET bit in the Tsi148 VME Control Register via software.

Note: The VME reset will remain asserted until this bit is cleared, so it is important to clear this bit after setting it. Not doing so will result in the illumination of the VME Failure LED as described in *Table C-3* on page C-9

2.7.5.2 System Controller Local-to-VME Resets

When the XV1 is configured as the System Controller, a local reset can generate a reset to the VME backplane. In order to generate the reset, SB11 must be short/closed (see *Table B-5* on page B-7) and the "Enable SCON LRST to SRST" must be enabled in the BIOS setup menu (which the BIOS default setting is **disabled**). When configured this way, a front panel reset, Ctrl+Alt+Del, or other type of reset of the System Controller will result in a reset of the VME backplane.

If the XV1 is set as the System Controller, but does not meet the conditions mentioned above, it is still possible to issue a reset to the VME backplane. This can be done as mentioned above by setting the SRESET bit in the Tsi148 VME Control Register via software.

Note: Boards in the system may still boot even if the SRESET bit has not yet been cleared.

2.8 Environmental Specifications

Table 2-9. XV1 Environmental Specifications

Parameter	Operating		Non-Operating	
Temperature Range	–5° to 55° C[a]		–40° to 80° C	
Humidity Range [b] relative non-condensing at 104°F (40°C)	0% to 90%		0% to 90%	
Altitude Range	0 to 10,000 feet		0 to 30,000 feet	
Shock	30G @20 msec (Half-Sine), 3 pulses each axis		30G @20 msec (Half-Sine), 3 pulses each axis	
Vibration *Duration:* Test levels shall be applied for one hour in each test axis.	*Frequency*	*Vibration*	*Frequency*	*Vibration*
	10 Hz	$0.01g^2$ / Hz	10 Hz	$0.04g^2$ / Hz
	40 Hz	$0.01g^2$ / Hz	40 Hz	$0.04g^2$ / Hz
	100 Hz	$0.0007g^2$ / Hz	100 Hz	$0.005g^2$ / Hz
	200 Hz	$0.0007g^2$ / Hz	200 Hz	$0.005g^2$ / Hz
	2000 Hz	$0.00005g^2$ / Hz	2000 Hz	$0.001g^2$ / Hz
	Note: grms = 0.91		*Note:* grms = 2.97	
Electrostatic Discharge	15 kV		15 kV	

a—When operating with SOR-DIMMS, the maximum operating temperature is reduced to 40°C.

b—A non-condensing environment must be maintained at all times. Themis recommends that the board be operational (powered on) and temperature stabilized before and during humidity testing.

2.9 Regulatory Compliance

Table 2-10. XV1 Regulatory Compliance

Parameter	Specification
Shock testing procedure (in compliance with)	MIL-STD-901D
Vibration testing procedure (in compliance with)	MIL-STD-810F
PCB FAB Material	94VO
Restriction of Hazardous Substances (RoHS)	European Directive 2002/95/EC

2.10 Typical Power Requirements

Typical power requirements for the XV1 are listed in *Table 2-11* for 2 GB, 4 GB, 6 GB, and 8 GB total memory (based on both on-board soldered DDR2 SDRAM and DDR2 SOR-DIMM memory modules, see *Table 2-2* on page 2-3) .

Note: The typical power requirements regarding the auxiliary voltage for the Rear Transition Module are the same as listed below for the Paddle Board.

Table 2-11. Typical Power Requirements

Memory Capacity	Rail Voltage (DC)	2.13-GHz CPU Operating Speed	
		12V Power	5V Power
2 GB[a]	5-volts DC	14.0 watts	To be determined
	Auxiliary Voltage (Paddle Board)[b]	47.5 watts	To be determined
	Total:	**61.5 watts**	

Table 2-11. Typical Power Requirements (Continued)

Memory Capacity	Rail Voltage (DC)	2.13-GHz CPU Operating Speed	
		12V Power	5V Power
4 GB[a]	5-volts DC	14.0 watts	To be determined
	Auxiliary Voltage (Paddle Board)[b]	47.2 watts	To be determined
	Total:	**61.2 watts**	
6 GB	5-volts DC	14.0 watts	To be determined
	Auxiliary Voltage (Paddle Board)[b]	47.9 watts	To be determined
	Total:	**61.9 watts**	
8 GB	5-volts DC	14.0 watts	To be determined
	Auxiliary Voltage (Paddle Board)[b]	49.5 watts	To be determined
	Total:	**63.5 watts**	

a—No SOR-DIMM installed.

b—12-volt or 5-volt source from the P2 Paddle Board.

2.11 Airflow requirements

The airflow requirements for the XV1 are dependent on configuration and geographical location of the system. As a base guideline for sea level, each slot should receive at least 19 CFM of airflow. Some XV1 models occupy 2 slots, thus needing a total of 38 CFM of airflow (or greater).

Overview Section

Chapter 3

Hardware Overview

The following sections provide a description of the major components of the XV1.

3.1 Baseboard

For a block diagram of baseboard components, consult *Figure 2-1* on page 2-2.

3.1.1 Intel 5408 Quad-Core LV Xeon Processor

The Central Processing Unit (CPU) used in the XV1 is the Intel 5408 Quad-Core LV Xeon processor, available at an operating speed of 2.13 GHz. Each core is supported by an L1 cache of 64 KB (32-KB for instructions; 32-KB for data), and an L2 cache of 2x6MB.

The Intel 5408 Xeon architecture enables the system to use a wide range of peripherals and high-performance operating systems, including Linux, and Microsoft Windows.

For details on the Intel 5408 Xeon processor, refer to the Intel website at http://www.intel.com/.

3.1.2 Intel 5100 Memory Controller Hub (MCH)

The Intel 5100 Memory Controller Hub (MCH) supports development with high-

performance, low-power Intel multi-core processors, and allows bladed and dense-bladed system designs to fit within a maximum 200-watt power envelope. Power savings is derived from lower thermal design power (TDP) in the MCH, a low-power Intel I/O Controller Hub, and standard DDR2 memory technology.

The 5100 MCH is ideal for a wide range of applications, including storage area networks (SANs), network-attached storage (NAS), routers, medical imaging equipment, military signal and image processing, and telecommunications servers.

Features include:

- Lower power quad-core Xeon processors to reduce cooling and improve performance per watt for thermally constrained applications
- Fast-speed memory operating at 533/667 Mhz
- Registered ECC Dimms to protect data and improve reliability
- Virtualization Technology (VT) that assists virtualization software to deliver efficient solutions and greater capabilities, including 64-bit guest OS support
- The 5100 MCH supports six x4 PCI-Express links, with each x4 link able to be combined into three x8 links or one x16 link for configuration flexibility

3.1.3 Intel 82801 I/O Controller Hub (ICH)

The Intel 82801 I/0 Controller Hub (ICH) is a highly-integrated, multi-functional chip that provides the interface to the PCI Bus and integrates many of the functions needed in today's PC platforms. The ICH communicates with the host controller over a dedicated hub interface. This provides added flexibility in designing cost-effective system solutions.

Features include:

- PCI 2.2 compliant with support for 33-MHz PCI operations
- ACPI Power Management Logic Support
- Enhanced DMA controller, interrupt controller, and timer functions
- Integrated IDE controller support
- System Management Bus with additional support for I2C devices
- Low-Pin Count (LPC) interface
- Firmware Hub (FWH) interface support

3.1.4 82571EB Dual Gigabit Ethernet Controller

The Intel 82571EB Gigabit Ethernet Controller is a single, compact component with two fully integrated Gigabit Ethernet Media Access Control (MAC) and physical layer (PHY) ports. This device uses the PCI Express architecture (Rev. 1.0a), and enables a dual-port Gigabit Ethernet implementation in a very small area. This is useful for server and workstation network designs with critical space constraints. The Intel 82571EB Gigabit Ethernet Controller provides two IEEE 802.3 Ethernet interfaces for 10/100/1000 Base-T applications. Both ports also integrate a Serializer-Deserializer (SerDes) to support 1000Base-SX or 1000Base-LX (optical fiber) and Gigabit backplane applications. In addition to managing MAC and PHY Ethernet layer functions, the controller manages PCI Express packet traffic across its transaction, link, and physical/logical layers.

Other features include:

- Wide internal data paths efficiently handle large address and data words
- Combined parallel and pipelined logic architecture efficiently handles packets with minimum latency
- Advanced interrupt-handling features and efficient ring-buffer descriptor data structures, with up to 64 packet descriptors cached on chip
- Offloads tasks from the host, such as checksum calculations for Transmission Control Protocol (TCP), User Datagram Protocol (UDP), and Internet Protocol (IP)

3.1.5 SCH5027 Super I/O Controller

The SMSC SCH5027 is a 3.3-volt compliant Super I/O controller with an LPC interface that includes hardware monitoring capability, enhanced security features, power control logic, and motherboard glue logic. Its hardware monitoring capability includes temperature, voltage, and fan-speed monitoring, and it can alert the system to out-of-limit conditions and automatically control the speeds of multiple fans.

Other features include:

- Support for monitoring two external temperatures via thermal diode inputs and an internal sensor to measure ambient temperature
- Complete legacy Super I/O functionality, including 8042=-based KB/M controller, IEEE 1284, EPP, and ECP-compatible parallel port, serial port, IR port, and floppy-disk controller
- ACPI 1.0/2.0 compatibility, therefore supports multiple low power-down modes
- Support for the ISA Plug-and-Play Standard register set (v1.0a)

3.1.6 Tundra Tsi148 PCI/X-to-VME Bridge

The Tundra Tsi148 PCI/X-to-VME Bridge is fully compliant with the 2eSST and VME64 Extension standards. It increases a system's usable bus bandwidth because its local bus interface is designed for the next-generation PCI-X processors and peripherals that support either a 66MHz PCI bus or a 133-MHz PCI-X bus interface.

- Full VMEbus system controller functionality
- Interrupt and interrupt-handling capability
- Flexible register set; programmable from both the PCI-X bus and VMEbus
- Fully compliant, programmable PCI or PCI-X bus interface
- 64-bit data path
- Multiple modes of bus operation
  - — PCI-X operates from 50 to 133 MHz
  - — PCI bus operates from 33 to 66 MHz
- 32-bit or 64-bit addressing and data in PCI and PCI-X modes
- Two programmable DMA controllers with Direct mode and Linked-List mode support
- IEEE 1149.1 interface
- 456 PBGA package

3.1.7 Programmable Logic

Programmable logic is supported by an FPGA (Field-Programmable Gate Array) device installed on the XV1.

The FPGA resides on the PCI bus and is the conduit to the GPIO, BIOS flash, status LEDs, configuration and resistor jumpers, and the buffer control switch.

3.1.8 BIOS Flash Memory

The XV1 contains two 2-MB (16-Mbits) programmable BIOS SPI Flash memory devices (primary and backup), which serve to boot the system. These Serial Peripheral Interface Flash devices are attached to the Intel 82801 ICH chip (see *Figure 2-1* on page 2-2 in Chapter 2, "XV1 Features and Specifications").

The BIOS occupies approximately 512 KB of system memory.

3.1.9 ATI ES1000/RN50 2D Graphics

The XV1 utilizes ATI's (presently AMD) RN50 2D embedded graphics. The RN50 provides Optimum 2D Performance for applications running in 16-bit or 32-bit color. The RN50 provides acceleration of GDI (Graphics Device Interface) extensions like Alpha BLTs (Block Transfers), Transparent BLTs, and Gradient Fills, as well as exclusive alpha cursor support.

3.1.9.1 General and Interfacing Features

Listed below are general and interfacing features of the RN50:

- 32-bit PCI bus (Rev 2.2), 3.3V with bus mastering support.
- One CRT controller capable of supporting two identical simultaneous display paths.
- Static and dynamic Power Management support (APM as well as ACPI) with full VESA DPMS and Energy Star compliance.
- DDC1 (Display Data Channel) and DDC2 for plug and play monitors.
- Single chip solution in 0.13 micron, 1.2V CMOS technology in a BGA (Ball Grid Array) package.

3.1.9.2 2D Acceleration

Listed below are detailed capabilities of the 2D acceleration:

- Highly-optimized 128-bit engine, capable of processing multiple pixels/clock.
- Optimized handling of fonts and text using ATI (presently AMD) proprietary techniques.
- Acceleration in 8/16/32 bpp (Bits Per Pixel) modes (8bpp indexed color mode). Also enhanced with 4444 a RGB 16-bit mode and 88 alpha/index 16-bit mode.

3.1.9.3 Display Features

Listed below are some of the RN50's main display features:

- Supported resolutions from 640x480 to 1600x1200.
- Single resolution, up to 1600x1200, at 75Hz refresh rate, and 16-bit color. (*Note;* in panel display, the maximum refresh rate for 1600x1200 is 60Hz.)
- Support for flat panel displays via DVO (Digital Video Out).

3.1.9.4 Bus Support

The RN50 supports PCI version 2.2 with full bus mastering and scatter / gather support, and utilizes 3.3V PCI interface.

3.1.9.5 Packaging

The RN50 comes in a 359-pin BGA in a 23x23 mm package.

3.2 PMC/XMC Carrier Boards

Caution: The original Themis 2P2 PMC/XMC Carrier Board or 2P2/2P3 PMC Carrier Boards cannot be installed onto the XV1. A new PMC/XMC Carrier Board has been developed. See Also, pg XV.

3.3 I/O-Expansion Board

Model XV1/3 has been designed with an I/O-Expansion Board in the second VME slot that allows two additional PMC/XMC Modules to be installed in the system (see *Figure 3-1*). The Themis 2PX2 provides the expanded I/O capability and is 2/3 (4RU) of the length of the Baseboard in order to accommodate the 2-slot high heat sink covering 1/3 of the surface of the baseboard.

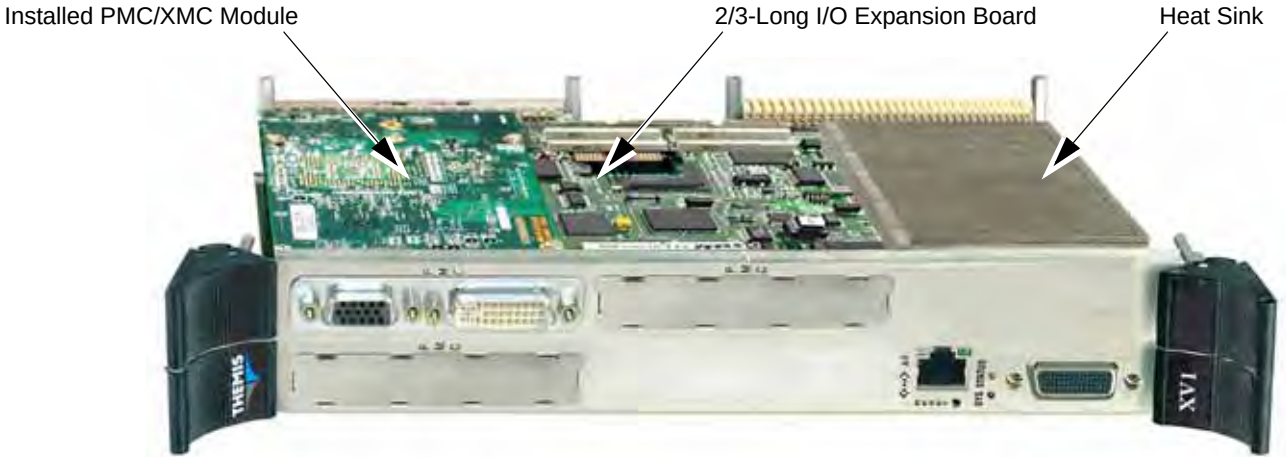


Figure 3-1. The I/O-Expansion Board on the XV1/3 Supports 2 PMC/XMC Modules

3.4 FPIO-Expansion Board

For a block diagram of all the components, consult *Figure 2-4* on page 2-7.

3.4.1 Broadcom BCM53115M Ethernet Switch

The Broadcom BCM53115M Gigabit Ethernet switch is a single, compact component with automatic learning and aging 4K MAC addresses and 65-nm process, non-blocking, five 10/100/1000 PHY ports (two on the front panel). This device has IEEE 802.1 Q-based VLAN with 4k entries ensuring proper Layer 2 isolation and security. Integrated QoS technology supports all types of consumer connections, including VoIP, video, audio, and data.

Other features include:

- MAC–based VLAN
- Port, MAC, IEEE 802.1P, and IPv4/IPv6 DSCP-based QoS
- 9KB jumbo frame support, 128 KB packet buffer, and 64 multicast group support
- Spanning Tree Support
- Port mirroring, LLDP, LACP

3.4.2 Realtek ALC262 Audio Codec

The Realtek ALC262 is a 4-channel High Definition Audio Codec with UAA (Universal Audio Architecture), featuring two 24-bit stereo DACs and three 20-bit stereo ADCs. This device achieves over 100db Signal-to-Noise ration playback quality, meeting PC2001 requirements. All the features of the ALC262 are designed for high-performance multimedia systems.

Other features include:

- ADCs with 90db SNR
- Stereo DACs support 16/20/24-bit PCM format
- All DACs support 44.1K/48K/96K/192KHz sample rate
- All ADCs support 44.1K/48K/96KHz sample rate
- Meets Microsoft WHQL/WLP 2.0 audio requirements
- Power support: Digital: 3.3V; Analog 3.3V/5.0V

3.4.3 Cypress CY7C65620 USB 2.0 Hub Controller

The Cypress CY7C65620 is a low-power USB 2.0 hub controller with integrated upstream and downstream transceivers, USB serial interface engine (SIE), USB hub control and repeater logic, and TT (Transaction Translator) logic. The SIE (Serial Interface Engine) handles Bit stuffing and unstuffing, checksum generation and checking, TOKEN type identification, and address checking independently of the Hub Control Block. The Hub Repeater supports full or low-speed connectivity and high-speed connectivity. The TT translates data from one speed to another. The TT takes high speed split transactions and translates them to full or low-speed transactions when the hub is operating at high-speed (the upstream port is connected to a high-speed host controller) and has full or low speed devices attached.

Other features include:

- USB-IF certified: TID# 30000009; WHQL Compliant
- Supports bus powered and self powered modes
- 24MHz external crystal (integrated phase-locked loop (PLL))
- In-system EEPROM programming
- Fully compliant with USB 2.0 specification
- Single transaction translator (TT)

Appendix A

Connector Pinouts and Signal Descriptions

This appendix describes connector pinouts and their signals for the XV1 and its associated Paddle Board. The XV1 rear connectors, front-panel connectors, and Paddle Board connectors are each presented as individual sections.

Note: The **primary IDE** interface is used to communicate with the onboard flash drive, but is not available through an external connector.

A.1 XV1 Rear Connectors

A.1.1 VME P1 Connector

- *Connector Type:* 3-row, 96 pins (3x32), VME64 (Male)
- *Manufacturer; Part Number:* Harting; 9031966921

The connector pinout for the 3-row, VME P1 connector is shown in *Figure A-1*. Connector-pin signal descriptions are described in *Table A-1* on page A-2.

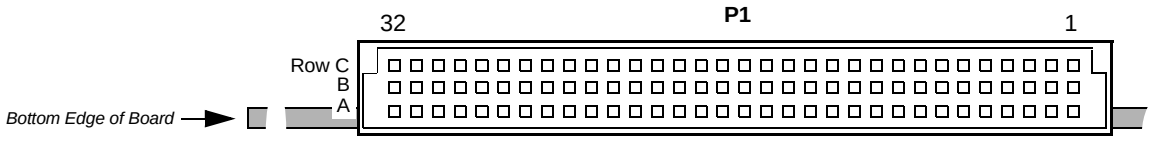


Figure A-1. XV1 VME P1 Connector Pinout

Table A-1. XV1 VME P1 Connector-Pin Signals

Pin	Row A Signal	Row B Signal	Row C Signal
1	VME_D00	VME_BBSY_L	VME_D08
2	VME_D01	VME_BCLR_L	VME_D09
3	VME_D02	VME_ACFAIL_L	VME_D10
4	VME_D03	VME_BGIN0_L	VME_D11
5	VME_D04	VME_BGOUT0_L	VME_D12
6	VME_D05	VME_BGIN1_L	VME_D13
7	VME_D06	VME_BGOUT1_L	VME_D14
8	VME_D07	VME_BGIN2_L	VME_D15
9	GND	VME_BGOUT2_L	GND
10	VME_SYSCLK	VME_BGIN3_L	VME_SYSFAIL_L
11	GND	VME_BGOUT3_L	VME_BERR_L
12	VME_DS1_L	VME_BR0_L	VME_SYSRESET_L
13	VME_DS0_L	VME_BR1_L	VME_WORD_L
14	VME_WRITE_L	VME_BR2_L	VME_AM5
15	GND	VME_BR3_L	VME_A23
16	VME_DTACK_L	VME_AM0	VME_A22
17	GND	VME_AM1	VME_A21
18	VME_AS_L	VME_AM2	VME_A20
19	GND	VME_AM3	VME_A19
20	VME_IACK_L	GND	VME_A18
21	VME_IACKIN_L	*Not Connected*	VME_A17
22	VME_IACKOUT_L	*Not Connected*	VME_A16
23	VME_AM4	GND	VME_A15
24	VME_A07	VME_IRQ7_L	VME_A14
25	VME_A06	VME_IRQ6_L	VME_A13
26	VME_A05	VME_IRQ5_L	VME_A12
27	VME_A04	VME_IRQ4_L	VME_A11
28	VME_A03	VME_IRQ3_L	VME_A10
29	VME_A02	VME_IRQ2_L	VME_A09
30	VME_A01	VME_IRQ1_L	VME_A08
31	–12V	*Not Connected*	+12V
32	VCC	VCC	VCC

_L Indicates an active low.

A.1.2 VME P2 Connector

- *Connector Type:* 5-row, 160 pins (5x32), VME64 (Male)
- *Manufacturer; Part Number:* Harting; 02-01-160-2101

The connector pinout for the 5-row XV1 VME P2 connector is shown in *Figure A-2*. Connector-pin signals routed to the P2 connector are described in *Table A-2* on page A-4. To access these P2 connector signals, a XV1 VME P2 Paddle Board (purchased separately) must be attached to the P2 backplane behind the XV1 (refer to Section A.5, “XV1 P2 Paddle Board,” on page A-13).

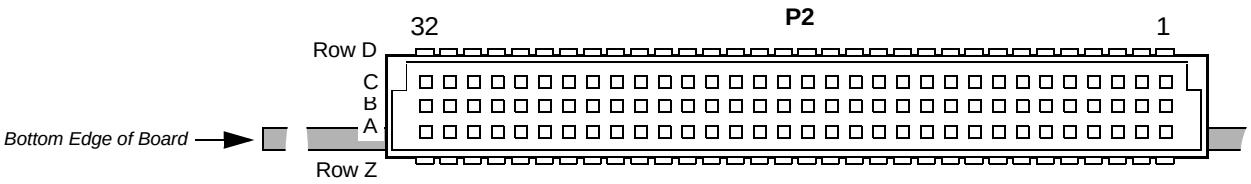


Figure A-2. XV1 VME P2 Connector Pinout

VME P2-connector pinouts signal assignments vary with the board jumper-resistor configurations (refer to Appendix B, “Jumper Pins and Solder Beads” for details).

Note: In *Table A-2*,

- an **_L** indicates an active low
- **(–)** and **(+)** indicate one member of a signal pair
- a **thick border** groups associated signals

Note: The XV1 offers provisions that allow the System Integrator to specify for the front panel (chassis) to be connected to ground. **As a factory default, the front panel (chassis) is not connected to ground.** It should be specified at the time of order whether the front panel is to be grounded. Possible grounding options include, but not limited to, being shorted to digital ground, and connected with a capacitor. If it is necessary to connect the front panel to ground, please contact Themis to discuss the proper grounding options for your application of the XV1 unit.

Table A-2. XV1 VME P2 Connector-Pin Signals

Pin	Row Z Signal	Row A Signal	Row B Signal	Row C Signal	Row D Signal
1	**VGA2_RED**	PWR_EN_L	VCC (+5V)	**USB4P**	GND
2	GND	VIN_AUX	GND	**USB4N**	**LAN_B_MDIN0**
3	**VGA2_GREEN**	VIN_AUX	VME_RETRY_L	**USB5P**	**LAN_B_MDIP0**
4	GND	GND	VME_A[24]	**USB5N**	GND
5	**VGA2_BLUE**	VIN_AUX	VME_A[25]	**OC_USB4_P2_L**	**LAN_B_MDIN1**
6	GND	GND	VME_A[26]	**OC_USB5_P2_L**	**LAN_B_MDIP1**
7	**HSYNC2**	VIN_AUX	VME_A[27]	**OC_USB2_P2_L**	GND
8	GND	GND	VME_A[28]	**OC_USB3_P2_L**	**LAN_B_MDIN2**
9	**VSYNC2**	**SATA_TXP3B**	VME_A[29]	**SIO_TXD2_P2**	**LAN_B_MDIP2**
10	GND	**SATA_TXN3B**	VME_A[30]	**SIO_RXD2_P2**	GND
11	**VGA2_DDC_DAT**	**SATA_RXP3B**	VME_A[31]	**PS2_KB_CLK_P2**	**LAN_B_MDIN3**
12	GND	**SATA_RXN3B**	GND	**PS2_KB_DATA_P2**	**LAN_B_MDIP3**
13	**VGA2_DDC_CLK**	GND	VCC (+5V)	**PS2_MS_CLK_P2**	GND
14	GND	**SATA_TXP4**	VME_D[16]	**PS2_MS_DATA_P2**	**LAN_A_MDIN0**
15	VCC	**SATA_TXN4**	VME_D[17]	**SIO_SMBDATA_B**	**LAN_A_MDIP0**
16	GND	**SATA_RXP4**	VME_D[18]	**SIO_SMBCLK_B**	GNC
17	V_3V3	**SATA_RXN4**	VME_D[19]	**HDA_RST_L**	**LAN_A_MDIN1**
18	GND	GND	VME_D[20]	**HDA_SYNC**	**LAN_A_MDIP1**
19	V_1V8	**SATA_TXP5**	VME_D[21]	**HDA_BIT_CLK**	GND
20	GND	**SATA_TXN5**	VME_D[22]	**HDA_SDIN3**	**LAN_A_MDIN2**
21	**SIO_RTS1_P2_L**	**SATA_RXP5**	VME_D[23]	**HDA_SDOUT**	**LAN_A_MDIP2**
22	GND	**SATA_RXN5**	GND	**USB2P**	GND
23	**SIO_DTR1_P2_L**	GND	VME_D[24]	**USB2N**	**LAN_A_MDIN3**
24	GND	GND	VME_D[25]	**USB3P**	**LAN_A_MDIP3**
25	**SIO_CTS1_P2_L**	VIN_AUX	VME_D[26]	**USB3N**	LAN_LINKA100_L
26	GND	GND	VME_D[27]	**SIO_TXD1_P2**	LAN_LINKA1000_L
27	**SIO_DSR1_P2_L**	VIN_AUX	VME_D[28]	**SIO_RXD1_P2**	**LAN_LINKB100_L**
28	GND	GND	VME_D[29]	VIN_AUX	**LAN_LINKB1000_L**
29	**SIO_DCD1_P2_L**	VIN_AUX	VME_D[30]	VIN_AUX	**LAN_ACTB_L**
30	GND	GND	VME_D[31]	V_3V3	**LAN_ACTA_L**
31	**SIO_RI1_P2_L**	VIN_AUX	GND	GND	**GND**
32	VCC (+5V)	VIN_AUX	VCC (+5V)	ALL_PWRGD	**LAN_ACTA_L**

A.2 XV1 Front-Panel Connectors

A.2.1 Gigabit Ethernet (GbE) Port C

- *Connector Type:* Single RJ45 GBE Connector, 8 Pin, 2 LEDs, transformer
- *Manufacturer; Part Number:* Pulse; J0G-0009NL

The XV1 provides a single Gigabit Ethernet (Ethernet C) port on its front panel. The RJ45 (8-pin) GBE connector contains two embedded LEDs, supports 10/100/1000Base-T transmission (see *Figure A-3* and *Table A-3* below), and has an embedded transformer for signal conversion. Port C is based upon the functionality of the Intel 82574 Gigabit Ethernet Controller.

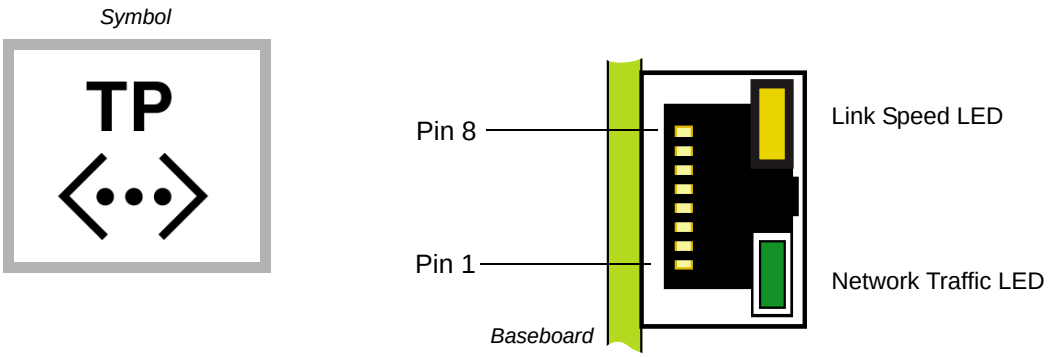


Figure A-3. Gigabit Ethernet RJ45 Connector Pinout

Table A-3. Gigabit Ethernet Connector-Pin Signals and LED Interpretation

Pin	Signal	Description
1	BI_DA+	Bi-directional pair A+
2	BI_DA–	Bi-directional pair A–
3	BI_DB+	Bi-directional pair B+
4	BI_DC+	Bi-directional pair C+
5	BI_DC–	Bi-directional pair C–
6	BI_DB–	Bi-directional pair B–
7	BI_DD+	Bi-directional pair D+
8	BI_DD–	Bi-directional pair D–

LED	LED Color	Interpretation
Yellow/ Green (*Top*) = Link Speed	OFF	10 Mb/s
	Yellow	100 Mb/s
	Green	1000 Mb/s
Green (*Bottom*) = Network Traffic	Flashing rate is 300 ms for transmit/receive activity.	

A.2.2 Multiple-I/O Connector

- *Connector Type:* 4-row, 60-pin (4x15) D-shell connector (Female)
- *Manufacturer; Part Number:* Molex; 70928-2003

The XV1 provides a single 60-pin connector on its front panel that supports four types of I/O ports; namely:

- Two Serial ports (COM1, COM2)
- One SATA port (SATA3)
- Two USB 2.0 ports (USB0, USB1)
- One VGA graphics port

To connect with each of these ports, a special multi-split connector cable is provided that can be attached directly to the multiple-I/O port (see *Figure A-4*).

Figure A-4. Multiple-I/O Connector Cable

Caution: Exercise care to ensure the proper orientation of the male connector (Multiple-I/O Connector Cable) when inserting into the female I/O connection on the font panel of the XV1. Despite the “D” shape of the connector, **it is possible** to force fit the connector 180° from the correct mating position. As such, please take care to insure the Multiple-I/O Connector Cable **is not** inserted backwards.

A connector pinout for the multiple-I/O connector is shown in *Figure A-5*.

Figure A-5. Multiple-I/O Connector Pinout

Connector-pin signals for the multiple-I/O connector are described in *Table A-4*.

Table A-4. Multiple-I/O Connector-Pin Signals[a]

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	USB2N FP	30	5V USB1 FP	31	HSYNC_5V	60	VSYNC_5V
2	USB2P FP	29	GND	32	VGA_DDC_DAT_5V	59	VGA_DDC_CLK_5V
3	USB1N FP	28	5V USB0 FP	33	VGA1_RED_OUT	58	GND
4	USB1P FP	27	GND	34	VGA1_GREEN_OUT	57	GND
5	GND	26	*Unconnected*	35	VGA1_BLUE_OUT	56	GND
6	SATA_RXP3[b]	25	*Unconnected*	36	GND	55	5V_VGA_CONN
7	SATA_RXN[b]	24	*Unconnected*	37	GND	54	GND
8	GND	23	*Unconnected*	38	SIO_DTR1_FP_L[b]	53	SIO_RI1_FP_L
9	SATA_TXN3[b]	22	SIO_TXD2_F[b]	39	SIO_TXD1_FP[b]	52	SIO_CTS1_FP_L
10	SATA_TXP3[b]	21	SIO_RXD2_F[b]	40	SIO_RXD1_FP[b]	51	SIO_RTS1_FP_L
11	GND	20	GND	41	SIO_DCD1_FP_L[b]	50	SIO_DSR1_FP_L
12	*Unconnected*	19	*Unconnected*	42	*Unconnected*	49	*Unconnected*
13	*Unconnected*	18	*Unconnected*	43	*Unconnected*	48	*Unconnected*
14	*Unconnected*	17	*Unconnected*	44	*Unconnected*	47	*Unconnected*
15	*Unconnected*	16	*Unconnected*	45	*Unconnected*	46	*Unconnected*

a—The connector shell is connected to the front panel and may be optionally connected to digital GND

b—COM1, COM2, and SATA3 may be routed to the front panel or P2. Desired option must be mention at time of purchase.

A.2.2.1 Serial Ports COM1 & COM2

As shown in *Table A-4*, serial port COM1 is supported by multiple-I/O connector pins 38 to 41 and 50 to 53 (these include signals for modem support).

Serial port COM2 is supported by multiple-I/O connector pins 21 and 22 (transmit and receive only).

A.2.2.2 SATA3 Port

The SATA3 port is supported by multiple-I/O connector pins 6, 7, 9, and 10 (see *Table A-4*).

A.2.2.3 USB Ports USB0 & USB1

USB ports USB0 and USB1 are supported by multiple-I/O connector pins 1 to 4 and pins 28 and 30 (see *Table A-4*).

A.2.2.4 VGA Graphics Port

The VGA graphics port is supported by multiple-I/O connector pins 31 through 35 and pins 55, 59, and 60 (see *Table A-4*).

A.3 Push-Button RESET

A recessed push-button RESET switch is located behind the Front Panel of the XV1 and is accessible by inserting an object the size of a paper clip. The RESET switch will initiate a POR Reset, which is propagated throughout the XV1.

A.4 XV1 PMC Module Card Connectors

- *Connector Type:* 2-row, 64-pin connector (Female) (4 required)
- *Manufacturer; Part:* Molex; 71439-0864

An optional PMC Module card can be connected to the top side of the XV1 through four 64-pin connectors (the interface VIO supports 3.3V @66 MHz only):

- J21 / J11 .....*32-bit PCI*
- J22 / J12 .....*32-bit PCI*
- J23.....*64-bit PCI*
- J24.....*User I/O defined*

The PMC Module card has no I/O through the VME P2 connector of the XV1. The connector used for PMC card installation is shown in *Figure A-6*; three connectors are required for 64-bit operation, and two connectors for 32-bit operation.

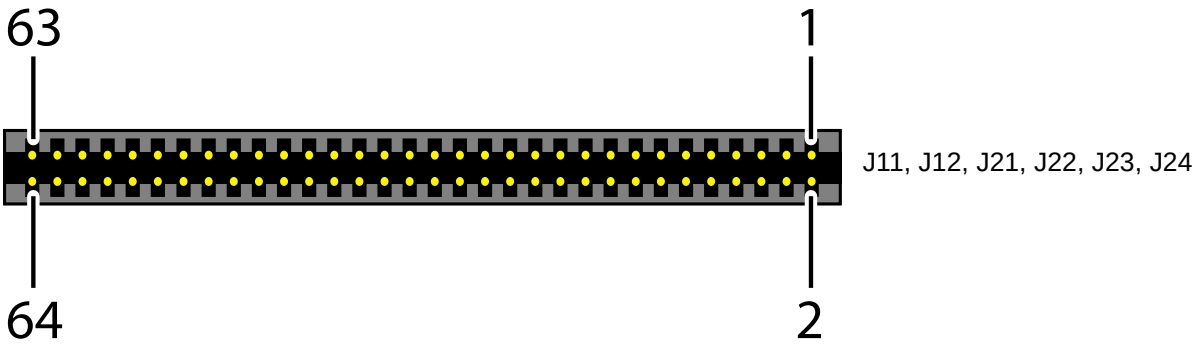


Figure A-6. PMC Module Card Connector (4 required)

A.4.1 PMC Module Connector J21 / J11

PMC signals (32-bit PCI) for connectors J21 and J11 are described in *Table A-5*.

Table A-5. PMC Module Card Connector J21/J11[a] Signals (32 bit)

Pin (J3401)	Signal	Pin (J3401)	Signal
1	TCK	2	-12V
3	Ground	4	INTA#
5	INTB#	6	INTC#
7	BUSMODE1#	8	+5V
9	INTD#	10	PCI-RSVD
11	Ground	12	PCI-RSVD
13	CLK	14	Ground
15	Ground	16	GNT#
17	REQ#	18	+5V
19	+3.3V	20	AD[31]
21	AD[28]	22	AD[27]
23	AD[25]	24	Ground
25	Ground	26	C/BE[3]#
27	AD[22]	28	AD[21]
29	AD[19]	30	+5V
31	+3.3V	32	AD[17]
33	FRAME#	34	Ground
35	Ground	36	IRDY#
37	DEVSEL#	38	+5V
39	Ground	40	LOCK#
41	SDONE#	42	SBO#
43	PAR	44	Ground
45	V(I/0)	46	AD[15]
47	AD[12]	48	AD[11]
49	AD[09]	50	+5V
51	Ground	52	C/BE[0]#
53	AD[06]	54	AD[05]
55	AD[04]	56	Ground
57	+3.3V	58	AD[03]
59	AD[02]	60	AD[01]
61	AD[0]	62	+5V
63	Ground	64	REQ64#

a—Connectors J21/J11 corresponds to the PMC standard Jn1.

A.4.2 PMC Module Connector J22 / J12

PMC signals (32-bit PCI) for connectors J22 and J12 are described in *Table A-6*.

Table A-6. PMC Module Card Connector J22/J12[a] Signals (32 bit)

Pin (J3402)	Signal	Pin (J3402)	Signal
1	+12V	2	TRST#
3	TMS	4	TDO
5	TDI	6	Ground
7	Ground	8	PCI-RSVD
9	*N/C*	10	PCI-RSVD
11	BUSMODE2#	12	+3.3V
13	RST#	14	BUSMODE3#
15	+3.3V	16	BUSMODE4#
17	PCI-RSVD	18	Ground
19	AD[30]	20	AD[29]
21	Ground	22	AD[26]
23	AD[24]	24	+3.3V
25	IDSEL	26	AD[23]
27	+3.3V	28	AD[20]
29	AD[18]	30	Ground
31	AD[16]	32	C/BE[2]#
33	Ground	34	PMC-RSVD
35	TRDY#	36	+3.3V
37	Ground	38	STOP#
39	PERR#	40	Ground
41	+3.3V	42	SERR#
43	C/BE[1]#	44	Ground
45	AD[14]	46	AD[13]
47	Ground	48	AD[10]
49	AD[08]	50	+3.3V
51	AD[07]	52	PMC-RSVD
53	+3.3V	54	PMC-RSVD
55	PMC-RSVD	56	Ground
57	PMC-RSVD	58	PMC-RSVD
59	Ground	60	PMC-RSVD
61	ACK64#	62	+3.3V
63	Ground	64	PMC-RSVD

a—Connector J7 corresponds to the PMC standard Jn2.

A.4.3 PMC Module Connector J23

PMC signals (64-bit PCI) for connector J23 are described in *Table A-7*.

Table A-7. PMC Module Card Connector J23[a] Signals (64 bit)

Pin (J3403)	Signal	Pin (J3403)	Signal
1	PCI-RSVD	2	Ground
3	Ground	4	C/BE[7]#
5	C/BE[6]#	6	C/BE[5]#
7	C/BE[4]#	8	Ground
9	+3.3V	10	PAR64
11	AD[63]	12	AD[62]
13	AD[61]	14	Ground
15	Ground	16	AD[60]
17	AD[59]	18	AD[58]
19	AD[57]	20	Ground
21	+3.3V	22	AD[56]
23	AD[55]	24	AD[54]
25	AD[53]	26	Ground
27	Ground	28	AD[52]
29	AD[51]	30	AD[50]
31	AD[49]	32	Ground
33	Ground	34	AD[48]
35	AD[47]	36	AD[46]
37	AD[45]	38	Ground
39	+3.3V	40	AD[44]
41	AD[43]	42	AD[42]
43	AD[41]	44	Ground
45	Ground	46	AD[40]
47	AD[39]	48	AD[38]
49	AD[37]	50	Ground
51	Ground	52	AD[36]
53	AD[35]	54	AD[34]
55	AD[33]	56	Ground
57	+3.3V	58	AD[32]
59	PCI-RSVD	60	PCI-RSVD
61	PCI-RSVD	62	Ground
63	Ground	64	PCI-RSVD

a—Connector J23 corresponds to the PMC standard Jn3.

A.4.4 PMC Module Connector J24

PMC connector J24 (which is not installed on the standard XV1 configuration), supports user-defined I/O signals. In the case of XV1, the SIO floppy interface signals have been routed to J24. Call Themis Customer Support for a detailed list of supported J24 signals.

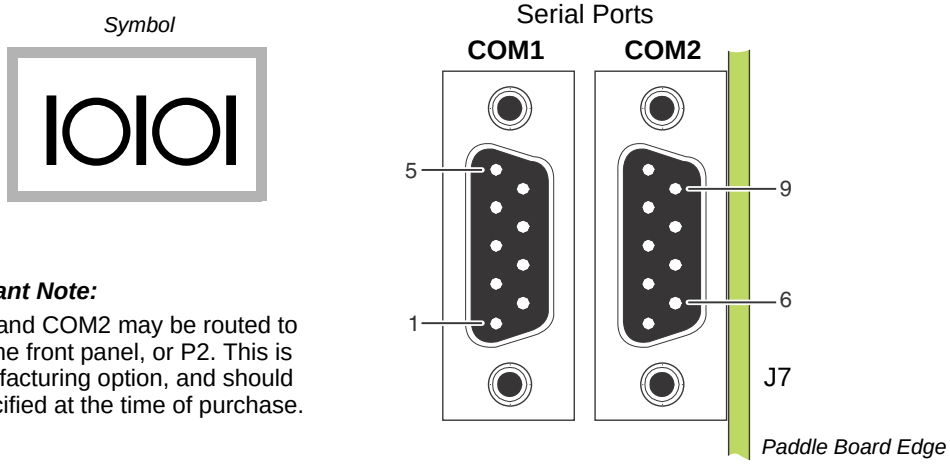
A.5 XV1 P2 Paddle Board

Figure D-2 on page D-3 in Appendix D, ”Board Component and Connector Diagrams” shows XV1 P2 Paddle-Board I/O connectors, which are described in the following sections.

A.5.1 Serial COM1 and COM2 Connectors

- *Connector Type:* Dual micro-D, 9-pin (Male) each, Right Angle, 2 required
- *Manufacturer; Part:* ITT Cannon; MDSM-18PE-Z10-VR25

The XV1 VME P2 Paddle Board contains two serial ports (COM1 and COM2) on its front edge, with COM1 offering modem support (see *Figure A-7* for a connector pinout, and *Table A-8* on page A-14 for pinout descriptions). Note that modem support is available only through a 5-row VME backplane; a 3-row VME backplane supports transmit and receive signals only (see *Table A-2* on page A-4). With proper modifications, COM1 and COM2 are also accessible from the XV1 front panel, in which case, they cannot be accessed through the Paddle Board. Call the Themis sales office at the time of purchase to inform them as to where you would like to access the COM1 and COM2 ports.



Important Note:
COM1 and COM2 may be routed to either the front panel, or P2. This is a manufacturing option, and should be specified at the time of purchase.

Figure A-7. P2 Paddle Board Serial COM1 and COM2 Connector Pinout

Table A-8. P2 Paddle Board Serial COM1 and COM2 Connector-Pin Signals

Serial Port COM1			
Pin	**Signal Name**	**Pin**	**Signal Name**
A1	SIO_DCD1_L	A6	SIO_DSR1_L
A2	SIO_RXD1	A7	SIO_RTS1_L
A3	SIO_TXD1	A8	SIO_CTS1_L
A4	SIO_DTR1_L	A9	SIO_RI1_L
A5	GND		

Serial Port COM2			
Pin	**Signal Name**	**Pin**	**Signal Name**
B1	GND	B6	*NC*
B2	SIO_RXD2	B7	*NC*
B3	SIO_TXD2	B8	*NC*
B4	*NC*	B9	*NC*
B5	*NC*		

Note: NC = No Connect

A.5.2 DIN-8 PS/2 Keyboard/Mouse Connector

- *Connector Type:* 8-pin mini-DIN (Female)
- *Manufacturer; Part Number:* TYCO/AMP; 749179-1
- *Themis Cable P/N:* 110104-002

Connector-pin signals for the 8-pin mini-DIN PS/2 port (see *Figure A-8*) on the XV1 P2 Paddle Board are given in *Table A-9*.

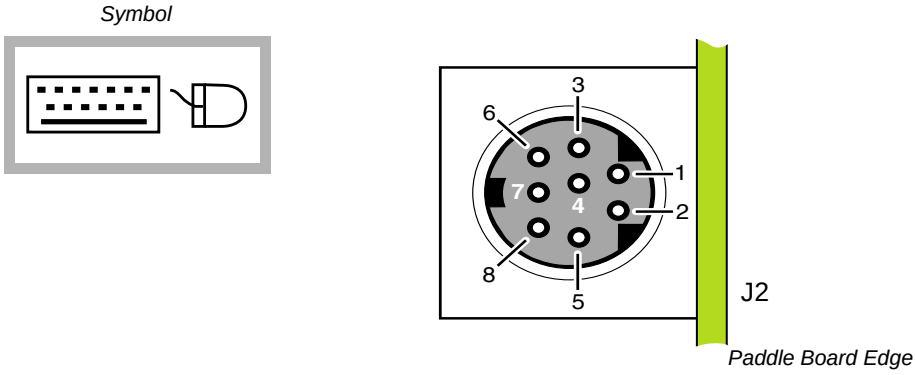


Figure A-8. P2 Paddle Board PS/2 Mini-DIN Connector Pinout

Table A-9. P2 Paddle Board PS/2 Connector-Pin Signals

Pin	PS/2 Signal	Pin	PS/2 Signal
1	GND (Ground)	5	KBD_CLK
2	GND (Ground)	6	KBD_DATA
3	+5V (Fused, 1.3A max)	7	MOUSE_CLK
4	MOUSE_DATA	8	+5V (Fused, 1.3A max)

A.5.3 USB Ports USB2 / USB3 and USB4 / USB5

- *Connector Type:* Type A, Dual Stacked USB
- *Manufacturer; Part:* AMP; 5787617-4

The XV1 P2 Paddle Board supports four USB Ports: dual USB2 / USB3 and dual USB4 / USB5, all installed on its front edge. A pinout for these stacked connectors is given in *Figure A-9*, and connector-pin signals are described in *Table A-10*. All USB ports support both version 2.0 and 1.1 standards.

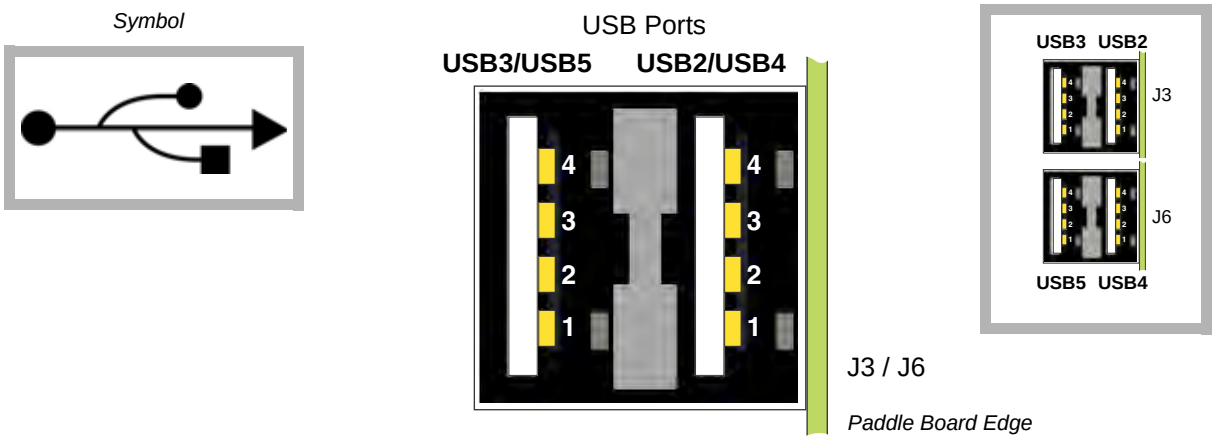


Figure A-9. P2 Paddle Board Dual USB Ports 2/3 and 4/5 Connector Pinout

Table A-10. USB Ports 2/3 and 4/5 Connector-Pin Signals

Pin	USB Signal	Description
A1	USB0_PWR	USB C Power
A2	USB0_D_N	USB C Data - Negative
A3	USB0_D_P	USB C Data - Positive
A4	USB0_GND	USB C Ground
B1	USB1_PWR	USB D Power
B2	USB1_D_N	USB D Data - Negative
B3	USB1_D_P	USB D Data - Positive
B4	USB1_GND	USB D Ground

A.5.4 SVGA Monitor Port (*5-Row VME Backplane Only*)

- *Connector Type:* 15-pin, D-Subminiature (Female) SVGA Connector
- *Manufacturer; Part:* AMP; 2-1734344-3

A Super-VGA connector is installed on the XV1 P2 Paddle Board on its front edge. A pinout for this connector is given in *Figure A-10*, and connector-pin signals are described in *Table A-11*. Note that the SVGA port is supported only from a 5-row VME backplane.

The P2 Paddle Board video SVGA signals are a redundant image of those from the XV1 Front Panel through the multiple-I/O connector.

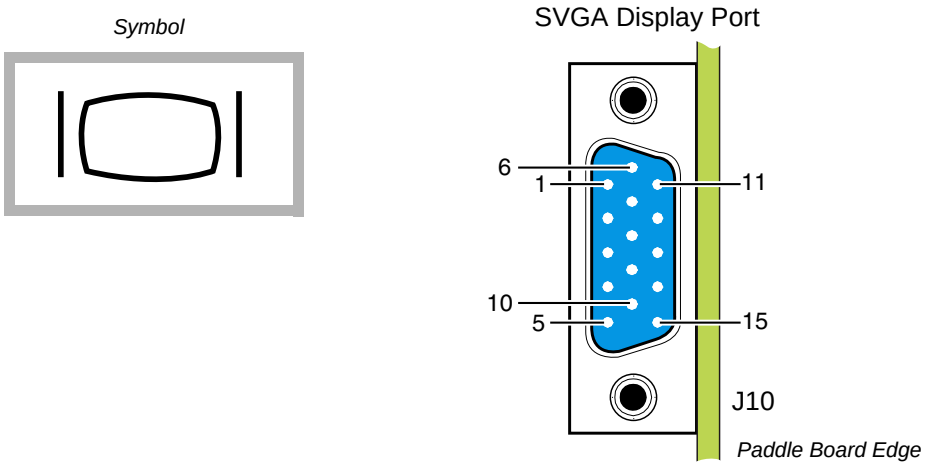


Figure A-10. P2 Paddle Board SVGA Connector Pinout

Table A-11. P2 Paddle Board SVGA Connector-Pin Signals

Pin	VGA Signal	Description
1	RED OUT	Red signal output
2	GREEN OUT	Green signal output
3	BLUE OUT	Blue signal output
4	*NC*	No connection
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground

Pin	VGA Signal	Description
9	VCC	Filtered Vcc voltage source
10	GND	Ground
11	*NC*	No connection
12	SDA	Display Data Channel—Data
13	HSYNC	Horizontal synchronization
14	VSYNC	Vertical synchronization
15	SCL	Display Data Channel—Clock

A.5.5 SATA Ports 3, 4, and 5

- *Connector Type:* Single 7-pin SATA Plug and Dual 7-pin SATA

- *Manufacturer; Part:* Molex; 47080-4005 (Single) / Circuit Assy; CA-D14SA HPR-C-0-5T (Dual)

Three SATA (Serial ATA) connectors (SATA3, SATA4, SATA5) are installed on the front edge of the XV1 CPU-0 P2 Paddle Board. A pinout is given in *Figure A-11*, and connector-pin signals are described in *Table A-12*.

Symbol

Note: The SATA4 and SATA5 connectors are joined in a dual assembly. SATA3 may be routed to either the front panel, or P2. Please specify option at time of purchase

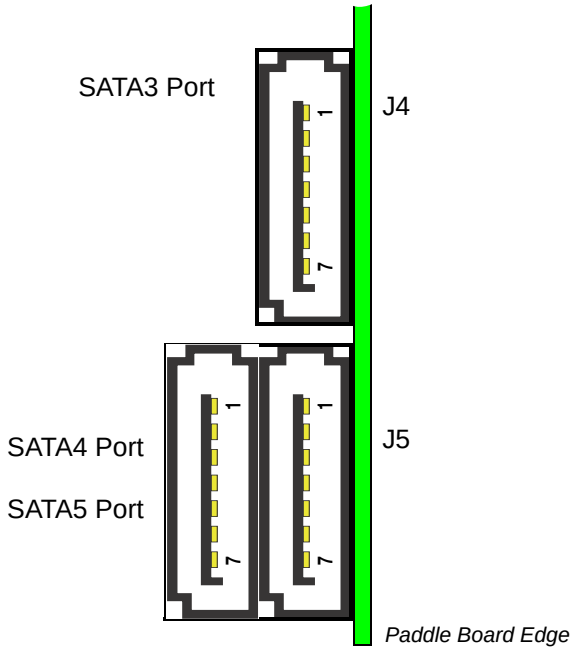


Figure A-11. P2 Paddle Board SATA Connector Pinout

Table A-12. P2 Paddle Board SATA Connector-Pin Signals

Pin	VGA Signal	Description
1	GND	Ground
2	Tx A+	Transmit Signal A-Positive
3	Tx A–	Transmit Signal A-Negative
4	GND	Ground
5	Rx A+	Receive Signal A-Positive
6	Rx A–	Receive Signal A-Negative
7	GND	Ground

A.5.6 Auxiliary +12-Volt/+5-Volt Power Connectors

- *Connector Type:* 6-pin In-line Connector (Female), 2 required
- *Manufacturer; Part:* Molex; 43650-0600
- *Themis Cable P/N:* 111230-001

A.5.6.1 Auxiliary +12-Volt Power Connector

The XV1 P2 Paddle Board provides +12-volt power to the XV1 from the 12-volt rail through multiple P2 pins in row A (see *Table A-2* on page A-4) of the VME P2 backplane. The system power supply also provides +12 volts to the paddle board through the 6-pin Molex connector J1 or J15—only one +12-volt connection is required (see *Figure A-12*; the mating plug is an ITT Cannon connector, P/N 192990-0980). Use power cable P/N 111230-001.

Warning: The Themis cable connected to this power connector should receive +12V directly from the +12V lug on the chassis power supply, not from +12V pins on the backplane or from the +12V cable supplying the backplane.

Power connector pinout signals are defined in *Table A-13*.

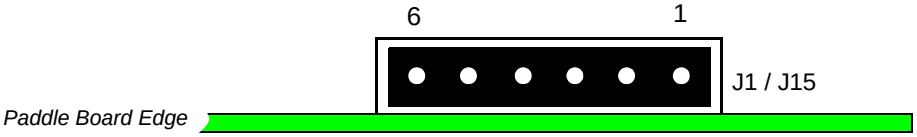


Figure A-12. P2 Paddle Board Power Connector Pinouts

Table A-13. +12V/+5V Power Connector-Pin Signals

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
+12V / +5V	+12V / +5V	+12V / +5V	Ground	Ground	Ground

A.5.6.2 Auxiliary +5-Volt Power Connectors

The system power supply can also provide +5 volts to the paddle board through connectors J1 and J15—due to increased current over +12, both +5-volt connections are recommended. Use two power cables (P/N 111230-001). Do not mix voltages, both connections should either be +5V or +12V.

A.5.7 Stereo Audio In/Out Connectors

- *Connector Type:* Stereo Mini-Jack (3.5 mm), 2 required
- *Manufacturer; Part:* Kobicon; 161-3503-EX

The two stereo (L/R) audio connectors on the front edge of the P2 Paddle Board are shown in *Figure A-13*, and are used to transmit analog audio signals, one for input, the other for output.

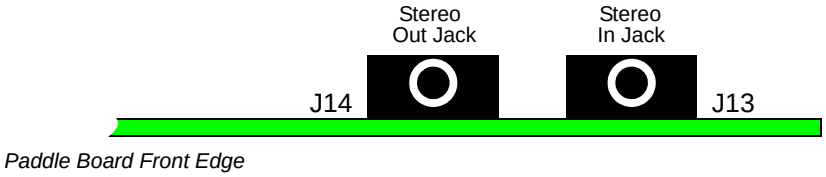


Figure A-13. P2 Paddle Board Stereo Audio Connectors

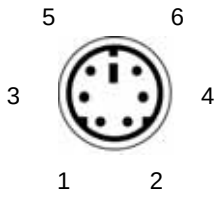
A.5.8 Gigabit Ethernet A and Ethernet B (*5-Row VME Backplane Only*)

Both gigabit Ethernet A and Ethernet B on the P2 Paddle Board are used for Themis testing purposes only.

A.6 FPIO-Expansion Board

All I/O ports on the front panel are of standard pin and signal definitions thus allowing the above to be referenced The FPIO-Expansion Board has two 6-pin mini-DINs which are not mentioned above. A drawing of the 6-pin mini-DIN with pin and signal definitions can be found in *Table A-14* on page A-20.

Table A-14. PS/2 Keyboard and Mouse Pinouts and Signal Definitions



Pin	Signal Name
1	Keyboard/mouse data
2	*N/C*
3	Ground
4	Vcc
5	Keyboard/mouse clock
6	*N/C*

Appendix B

Jumper Pins and Solder Beads

This appendix provides jumper-pin and solder-bead locations and configurations for the XV1. **Solder beads** are considered "factory-configurable" and *must not be altered* by the user. If a solder bead requires reconfiguration, contact Themis Customer Service.

Warning: Solder beads are set by Themis at the factory. Attempting to alter a solder-bead configuration could seriously damage the XV1. If you encounter a problem, contact Themis Customer Support.

DO NOT ATTEMPT TO ALTER SOLDER-BEAD CONFIGURATIONS.

B.1 Field-Configurable Jumper Pins

B.1.1 XV1 Jumper Pins

Jumper pins are found only on the top side of the XV1 system board and are described in *Table B-1* on page B-2. In *Table B-1*, an **ON** or **Short** jumper position means the jumper is installed, shorting the pins and completing the circuit. **OFF** means there is no jumper installed, hence the path between the pins is open, breaking the circuit.

Figure B-1 on page B-3 shows the location of all jumpers on the XV1. In *Figure B-1*, jumper pin 1 is identified with a **square** and a **triangle**.

Table B-1. XV1 Jumper-Pin Settings (Top Side Only)

Jumper Pins	Jumper Position[a]	Description
JP1	ON	Clears CMOS[b].
	OFF	Normal operation.
JP2	**ON**	Does not enable boot from SPI.
	OFF	Enables boot from SPI[c].
JP3	ON	*Reserved for future use*.
	OFF	
JP4	ON	Selects Backup SPI[b] BIOS.
	OFF	Selects Primary SPI BIOS.
JP5	ON	Flash is write-protected[d].
	OFF	Flash is not write-protected.
JP6	ON	*For factory purposes only.*
	OFF	
JP7	ON	Disables onboard video.
	OFF	Enables onboard video[e].
JP8	ON	VME System Controller is disabled. *Note:* If SB7 (see *Table B-3* on page B-5) is shorted, this function is reversed.
	OFF	Tsi148 will automatically evaluate the backplane signal BG3IN_ to determine if the System Controller function should be enabled.

a—Boldface = the default jumper position. Absence of a default position indicates a manufacturing or user decision.

b—Connection of the jumper to JP1 only needs to be momentarily contacted to the pins. Do not leave JP1 in the “on” position

c—SPI = Serial Peripheral Interface.

d—Please contact Themis for the specific Compact Flash to implement this feature.

e—Solder-Bead 1 (SB1) must be in the open setting as seen in *Table B-3* on page B-5.

B.1.2 Memory Module Jumper Pins

There are no jumper pins on the XV1 Memory Modules.

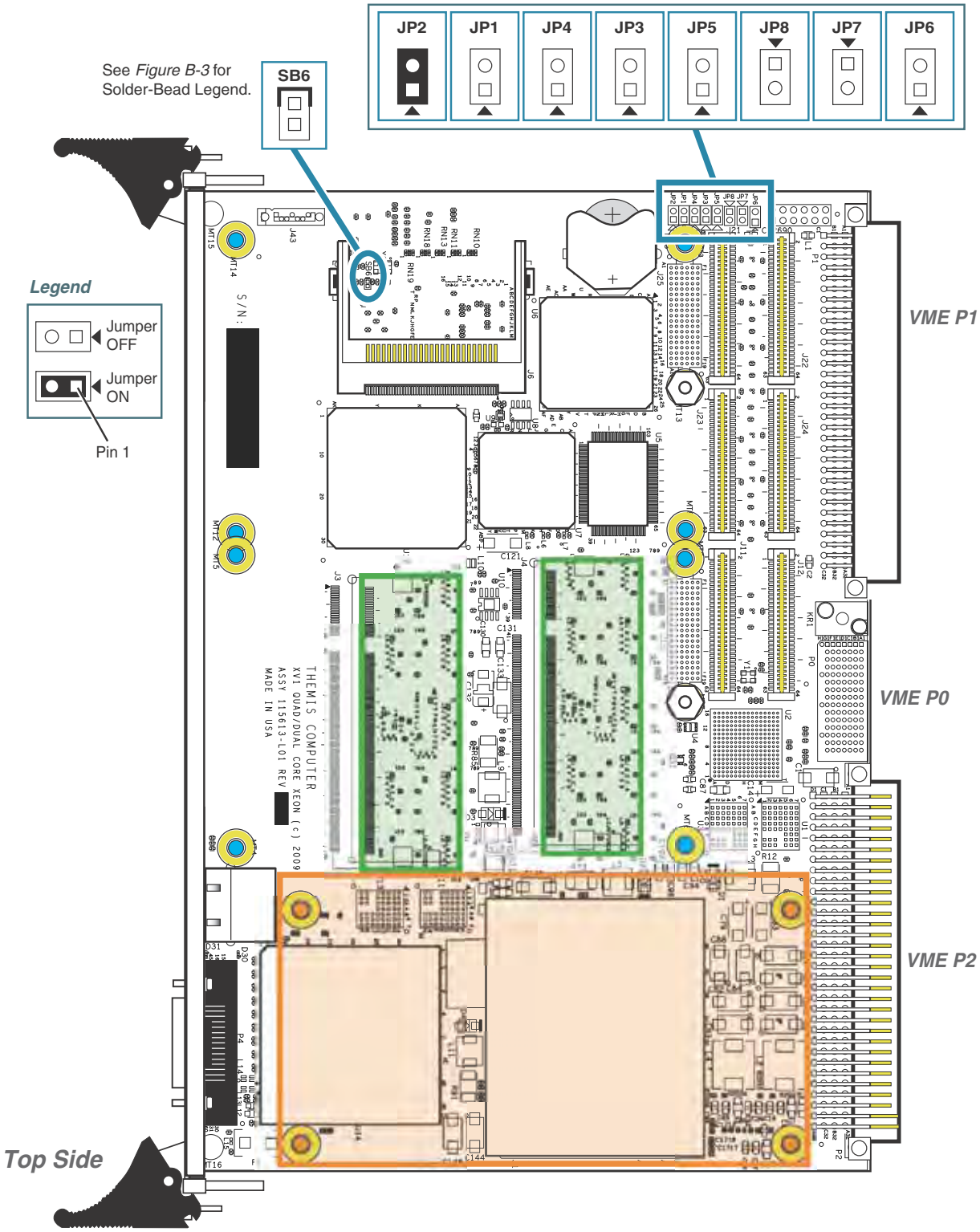


Figure B-1. XV1 Jumper-Pin and Solder-Bead Locations (Top Side)

B.1.3 XV1 Paddle-Board Jumper Pins

Jumper pins are found only on the *top side* of the XV1 Paddle Board and are described in *Table B-2*.

In *Table B-2*, an **ON** jumper position means the jumper is installed, shorting the pins and completing the circuit. **OFF** means there is no jumper installed, hence the path between the pins is open, breaking the circuit.

Table B-2. XV1 Paddle-Board Jumper-Pin Settings (Top Side Only)

Jumper Pins	Jumper Position	Description
JP1, JP2	ON	***Manufacturing use only.***
	OFF	

Figure B-2 on page B-4 shows the location of both jumpers on the XV1 Paddle Board. In *Figure B-2*, jumper pin 1 is identified with a **square** and a **triangle**.

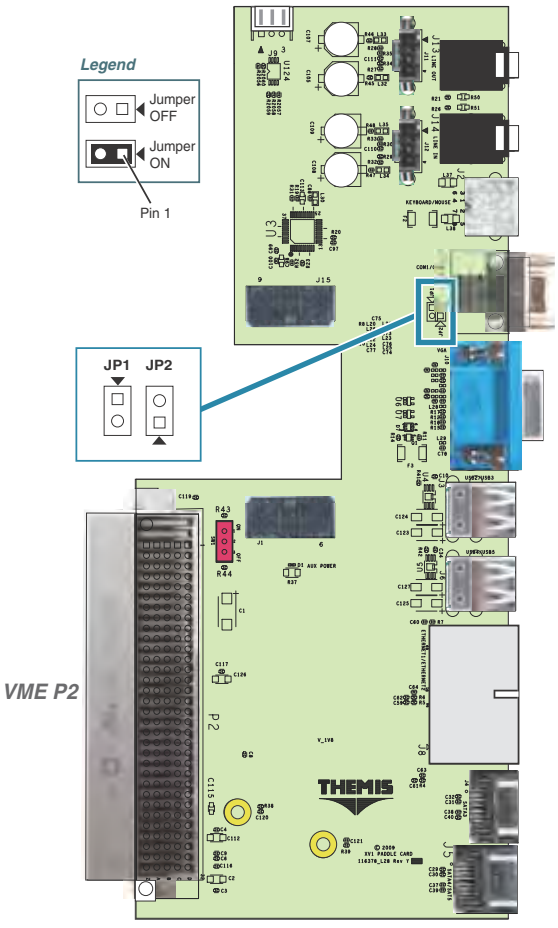


Figure B-2. XV1 Paddle-Board Jumper-Pin Locations (Top Side)

B.1.4 FPIO-Expansion Board Jumper Pins

There are no jumper pins on the FPIO-Expansion Board.

B.1.5 RTM (Rear Transition Module) Jumper Pins

There are no jumper pins on the RTM.

B.2 Factory-Configurable Solder Beads

B.2.1 XV1 Solder Beads

Solder beads are found mainly on the bottom side of the XV1 system board, with one solder bead (SB6) located on the top side. All solder beads are described in *Table B-3* on page B-5.

In *Table B-3*, **Short** means a solder bead is installed, creating an electrical path between two contacts. **Open** means no solder bead is installed, hence the path between the contacts is open.

Figure B-3, page B-5, shows the location of all bottom-side solder beads on the XV1. The location of the top-side SB6 is shown in *Figure B-1* on page B-3.

Remember that **pin 1** is indicated on the board by a **thick bar line**.

Caution: When dealing with a **3-pin** solder-bead switch, a solder bead will short only one set of pins, either 1–2 or 2–3.
If a solder bead shorts more than 2 pins, call Themis Customer Support.

Table B-3. XV1 Solder-Bead Settings (Bottom and Top Side)

Solder Bead	Setting[a]	Description
SB1	Short	Disable ES1000 VGA.
	Open	Enable ES1000 VGA[b].

Table B-3. XV1 Solder-Bead Settings (Bottom and Top Side) (Continued)

Solder Bead	Setting[a]	Description
SB2	Short 1–2	Compact Flash voltage is 5 volts.
	Short 2–3	Compact Flash voltage is 3 volts.
SB3	Short 1–2	See *Table B-4*.
	Short 2–3	
SB4	Short 1–2	See *Table B-4*.
	Short 2–3	
SB5	Short 1–2	See *Table B-4*.
	Short 2–3	
SB6 [Top Side]	Short	Disable FPGA. [See *Figure B-1*, page B-3, for top-side location.]
	Open	Enable FPGA. [See *Figure B-1*, page B-3, for top-side location.]
SB7	Short	**JP8 Not Installed:** SCON Automatically Detected **JP8 Is Installed**: SCON Enabled
	Open	**JP8 Not Installed:** SCON Automatically Detected **JP8 Is Installed:** SCON Disabled
SB10	Short	VME-to-Local resets are enabled.
	Open	VME-to-Local resets are disabled.
SB11	**Short**	See *Table B-5* on page B-7 for a detailed description.
	Open	

a—Boldface = the default solder-bead setting. Absence of a default setting indicates a manufacturing or user decision.

b—With SB1 open, enabling the ES1000 VGA is controlled by JP7, see *Table B-1* on page B-2

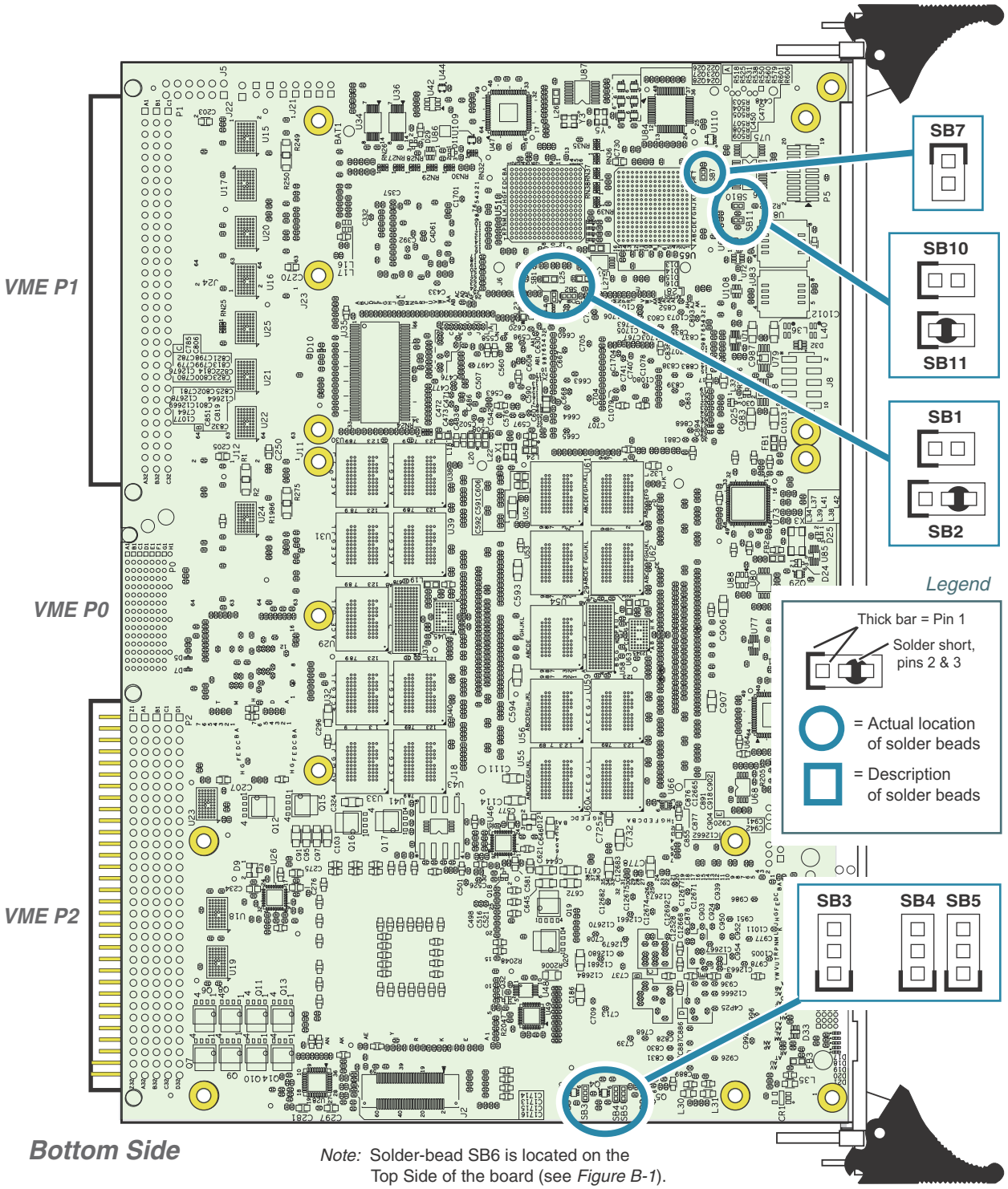
Table B-4. FSB Frequency Selection

SB5 [BSEL2]	SB4 [BSEL1]	SB3 [BSEL0]	Frequency
Short 2–3	Open	Open	166 MHz
Short 2–3	Open	Short 2–3	200 MHz
Short 2–3	Short 2–3	Short 2–3	266 MHz
Open	Short 2–3	Short 2–3	333 MHz
Short 1–2	**Short 1–2**	**Short 1–2**	**CPU Select[a]**

a—Your XV1 should always be configured for CPU Select. Other modes of operation are not supported by the XV1.

Table B-5. Local-to-VME Reset Behavior

SB11	System Controller	BIOS Setting EN_SCON_LRST_TO_SRST	VME Reset Driven from Local Reset
Short	Yes	Enabled	Yes
Short	Yes	Disabled (default)	No
Short	No	—	No
Open	—	—	No



Note: Solder-bead SB6 is located on the Top Side of the board (see *Figure B-1*).

Figure B-3. XV1 Solder-Bead Locations (Bottom Side)

B.2.2 Memory Module Solder Beads

There are no solder beads on the XV1 Memory Module.

B.2.3 XV1 Paddle-Board Solder Beads

There is one solder bead (SB1) on the XV1 Paddle Board. This solder bead should always be shorted, and is set as such from the manufacturing process.

B.2.4 P2 I/O Expansion-Board Solder Beads

The P2 I/O Expansion-Board has a total of three solder-bead locations. SB2 is located on the component side of the PCB, and SB1 & SB3 are located on the back of the PCB.

B.2.5 RTM (Rear Transition Module) Solder Beads

There are no solder beads on the RTM.

B.2.6 FPIO-Expansion Board Solder Beads

The FPIO-Expansion Board has three solder beads total. SB2 can be located on the component side of the PCB as seen in *Figure B-4* on page B-10. SB1 and SB3 can be located on the bottom of the PCB as seen in *Figure B-5* on page B-11. *Table B-6* on page B-12 lists the description and default setting for the solder beads on the FPIO-Expansion Board.

B.2.6.1 Component Side (PCB) Solder Beads

There is a single solder bead (SB2) on the component side (PCB) as seen in *Figure B-4* on page B-10. The description of SB2 can be found in table *Table B-6* on page B-12.

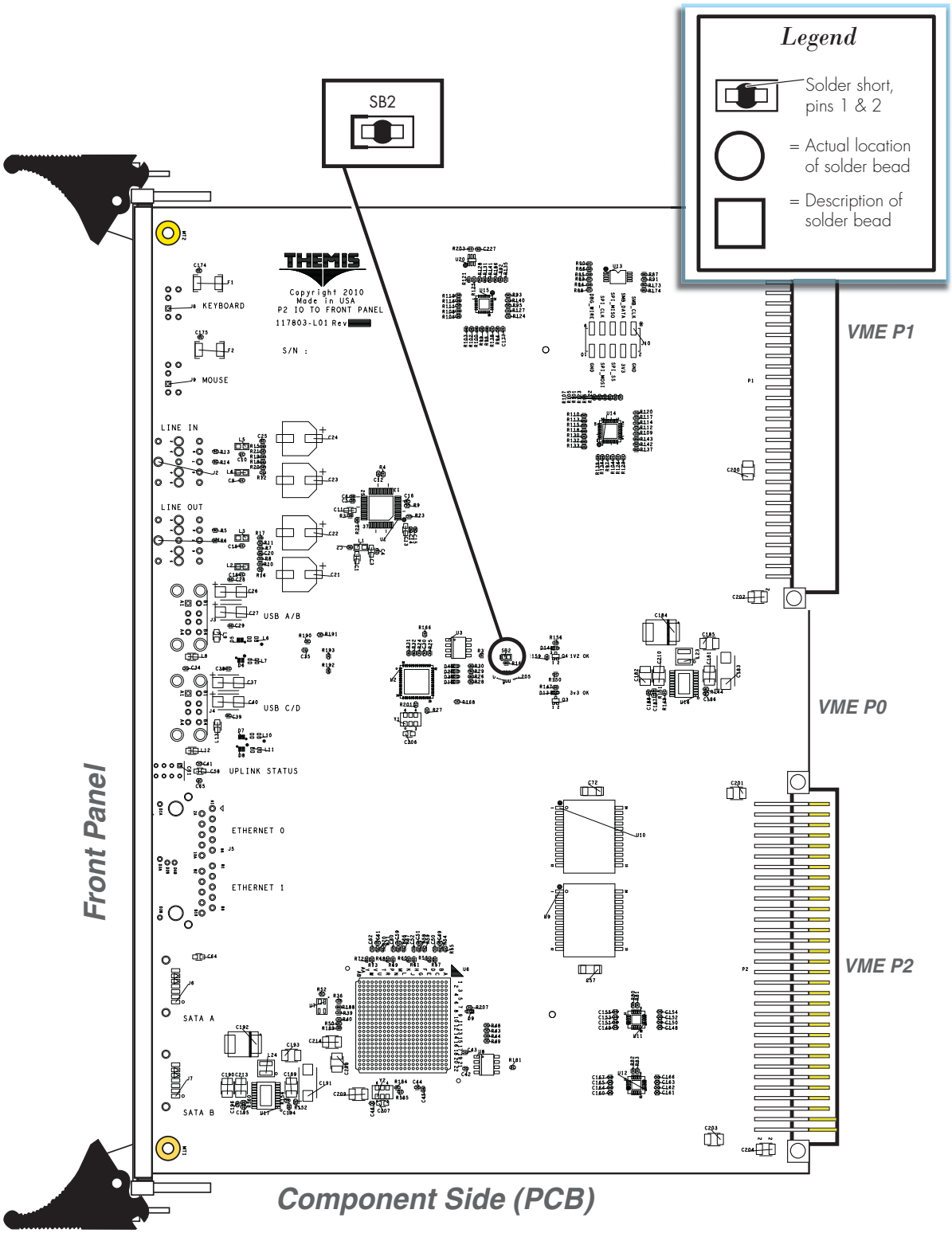


Figure B-4. FPIO Component Side Solder Bead

B.2.6.2 Bottom Side (PCB) Solder Beads

There are two solder bead (SB1 & SB3) locations on the bottom side (PCB) as seen in *Figure B-5* below. The description of SB1 and SB3 can be found in table *Table B-6* on page B-12.

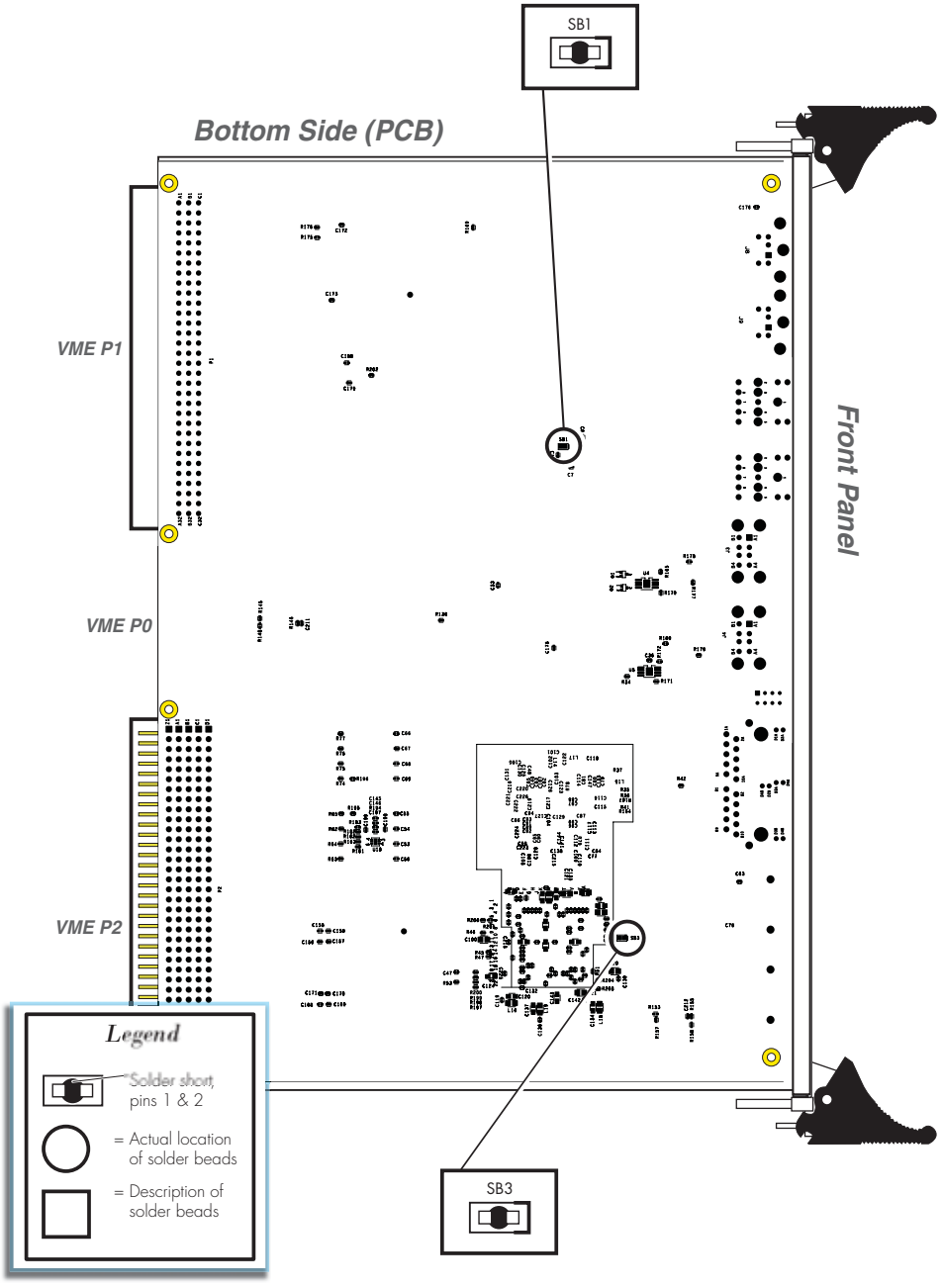


Figure B-5. FPIO Bottom Side Solder Beads

Listed in *Table B-6* below are the solder bead descriptions for the FPIO-Expansion Board.

Table B-6. FPIO Solder-Bead Settings (Bottom and Top Side)

Solder Bead	Setting[a]	Description
SB1	**Short**	Connects the HDA Audio Ground to Digital Ground This solder short helps reduce noise in the signal which could translate to perceived noise emitting from the output device (*i.e., speakers)*. Unless under specific test situations, SB1 should be shorted during normal operation of the FPIO-Expansion Board.
	Open	Does not make a connection between HDA Audio ground and Digital Ground. This setting is not advised for normal operation of the FPIO-Expansion Board.
SB2	**Open**	For Factory Use Only.
SB3	**Open**	For Factory Use Only.

a—Boldface = the default solder-bead setting. Absence of a default setting indicates a manufacturing or user decision.

Appendix C

Front-Panel I/O Connections and LEDs

C.1 Introduction

This appendix contains diagrams of all front panels (faceplates) for each possible model configuration of the XV1. It is intended as a reference to I/O and monitoring functions. See *Table C-1* for a list of XV1 models. Also found in this appendix is the front panel of the P2 I/O Expansion Board (117868-L01).

Caution: The PCI address of a PMC Module is not necessarily the same as the PMC Module slot number.

Table C-1. XV1 Model Configurations

Model	Baseboard
	PMC/XMC Modules
XV1 / 1	1 Module (1 VME Slot)
XV1 / 2	2 Modules (2 VME Slots)
XV1 / 3	3 Modules (2 VME Slots)

C.1.1 Front-Panel Dimensions

A single-slot XV1 front panel measures 235-mm (9.25”) high by 20-mm (0.78”) wide (with VME64-type handles) or 241-mm (9.5”) high by 20-mm (0.78”) wide (with older Legacy-VME handles).

C.1.2 Injector/Ejector Handles

The XV1 is equipped with two types of injector/ejector handles (see *Figure C-1* on page C-3):

- VME64-type handles (Elma, for example), which aid in both the insertion and the extraction of the PC board into and out of the VME backplane connectors
- Legacy-VME handles, which aid only in the extraction of the PC board from the VME backplane connectors

When a PCB board product such as the XV1 is shipped from Themis, VME64-type handles will be installed unless the customer specifies a different handle such as the Legacy-VME.

C.1.2.1 VME64-type Handles

When ordered, all Themis board products are shipped with VME64-type handles unless otherwise specified. A multiple-slot system will be shipped with all handles secured together by mating pins. One pin is inserted through two adjacent handles. This assures that all boards will lock onto and release from the VME rack frame at the same time.

On those occasions when the customer is upgrading and must add or replace a board in the system, it is important to make sure that a mating pin is used to secure two adjacent handles.

C.1.2.2 Legacy-VME Handles

When extracting a multiple-board system from the VME rack frame, it is important to remember that—since there is no mating pin to hold handles together—each handle works independently from all other handles, hence the operator must extract the system from the rack frame by carefully manipulating each handle in the same direction until the system is totally removed from the rack.

Caution: Removal of the EMI shield and insertion of a spine between mating front panels is a factory procedure and not recommended in the field.

A VME64 Injector/Ejector Handle

B Legacy-VME Ejector Handle

Figure C-1. PMC/XMC Injector/Ejector Handles

C.2 XV1 Front Panels

This section contains descriptive graphics of the front-panel I/O connections for each XV1 model configuration listed in *Table C-1* on page C-1 (see *Figure C-3*, page C-4, through *Figure C-5*, page C-6). Also shown below is the front-panel for the FPIO-Expansion Board.

C.2.1 Multiple-I/O Connector

The multiple-I/O connector on the XV1 front panel supports a total of four different types of I/O ports (see *Figure C-3*)—dual serial (COM1/COM2), single SATA3, dual 2.0 USB0/USB1, and VGA graphics. To attach to each of these different ports, a special multi-split connector cable must be connected to the multiple-I/O connector (see *Figure C-2*).

Figure C-2. Multiple-I/O Connector Cable

C.2.2 XV1/1—1 PMC/XMC Module

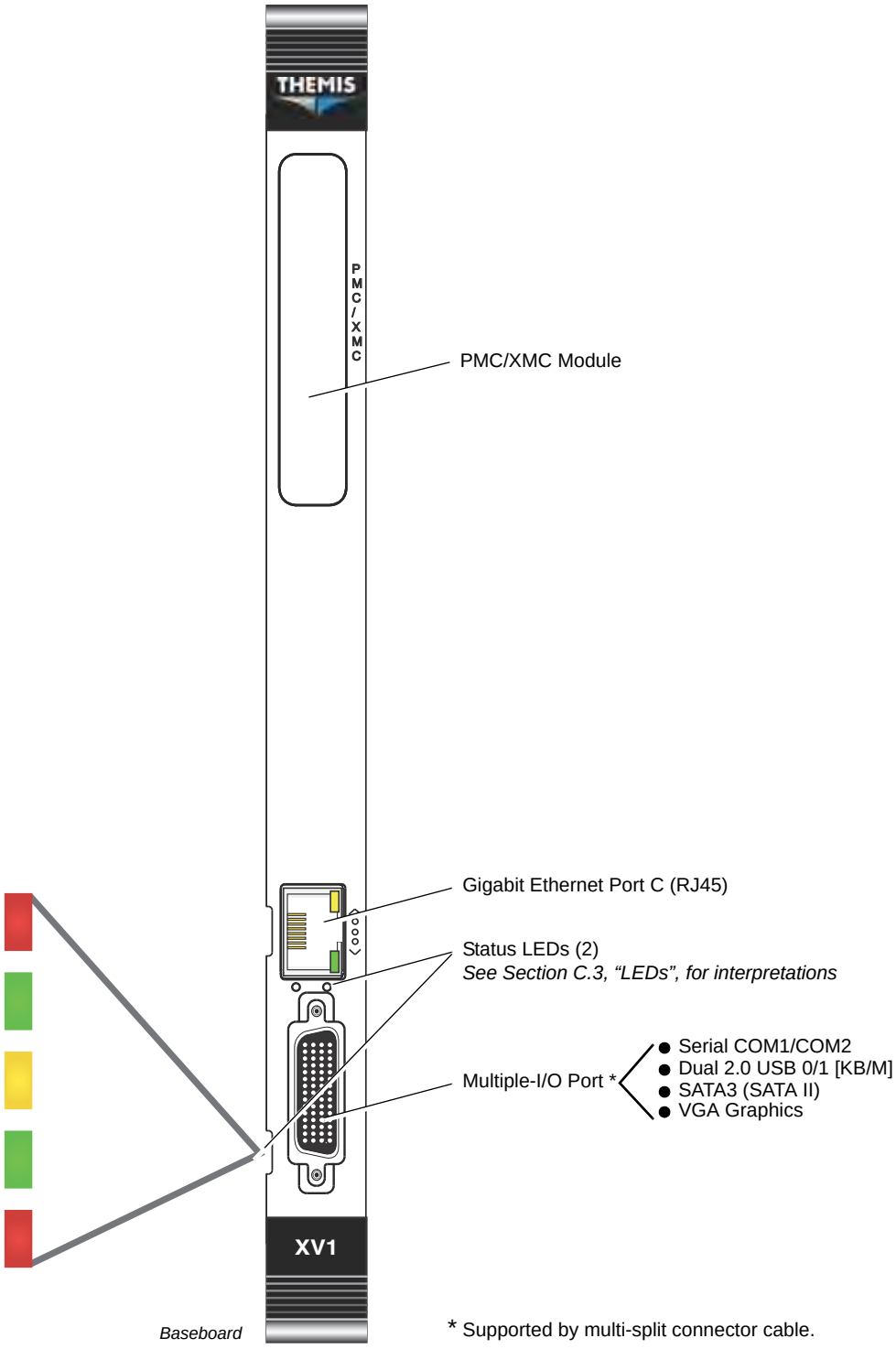


Figure C-3. XV1/1 Front Panel

C.2.3 XV1/2—2 PMC/XMC Modules

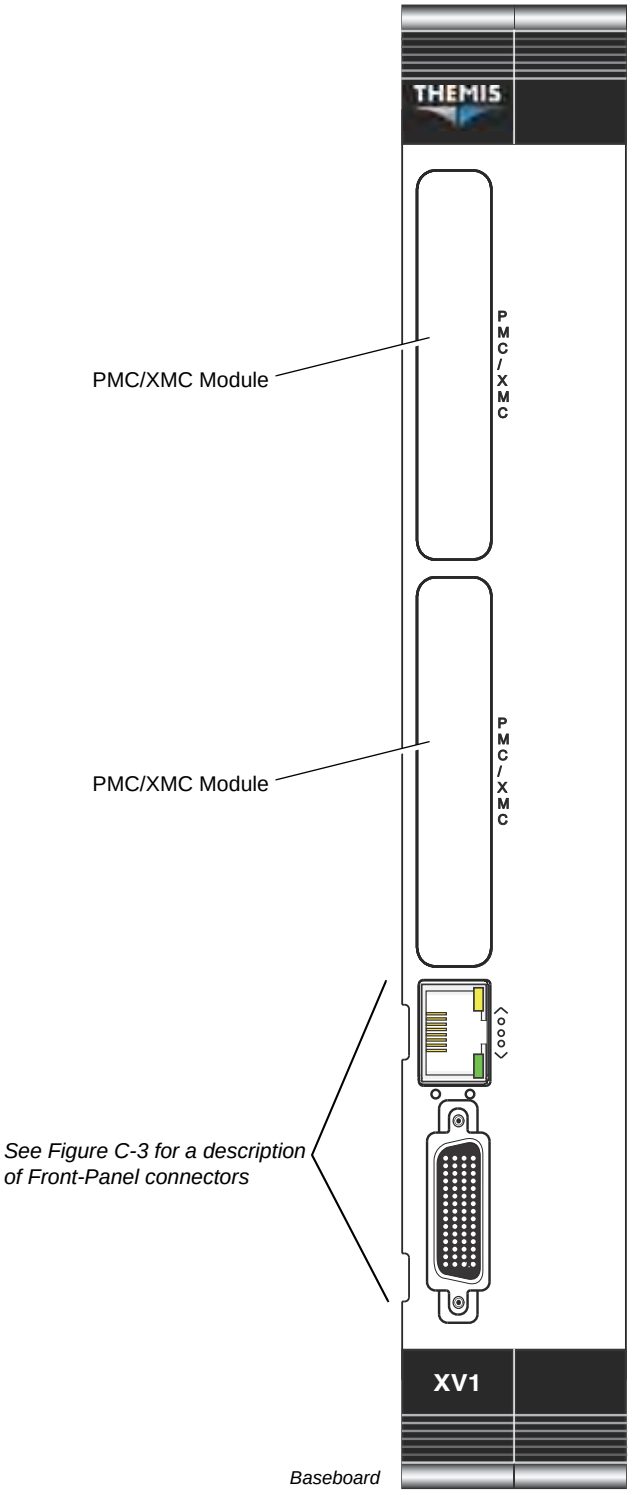


Figure C-4. XV1/2 Front Panel

C.2.4 XV1/3—3 PMC/XMC Modules

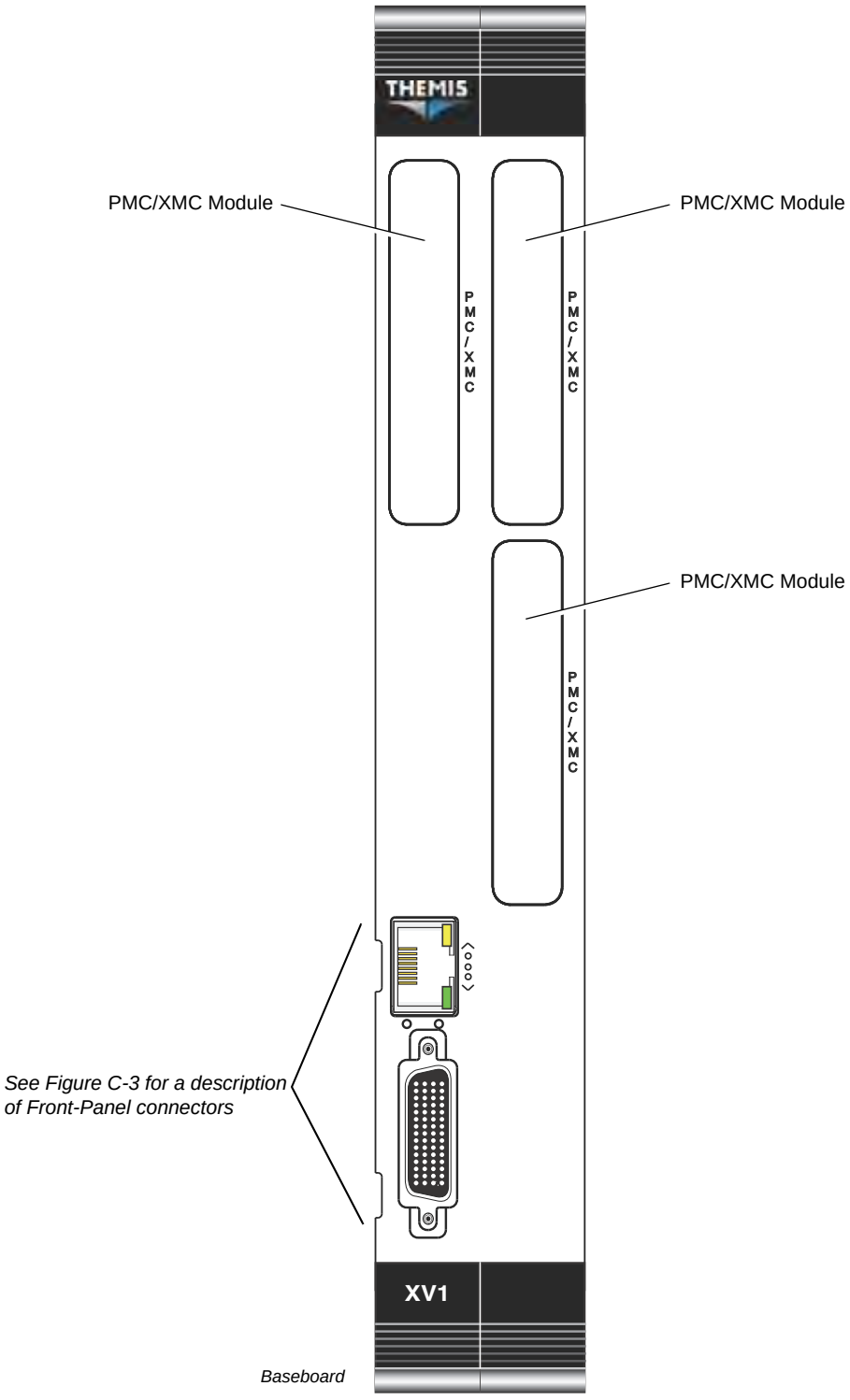


Figure C-5. XV1/3 Front Panel

C.3 XV1 LEDs

Callouts indicating front-panel LEDs are shown in *Figure C-6*. Description and interpretation of front-panel LEDs are given in *Table C-2* on page C-8.

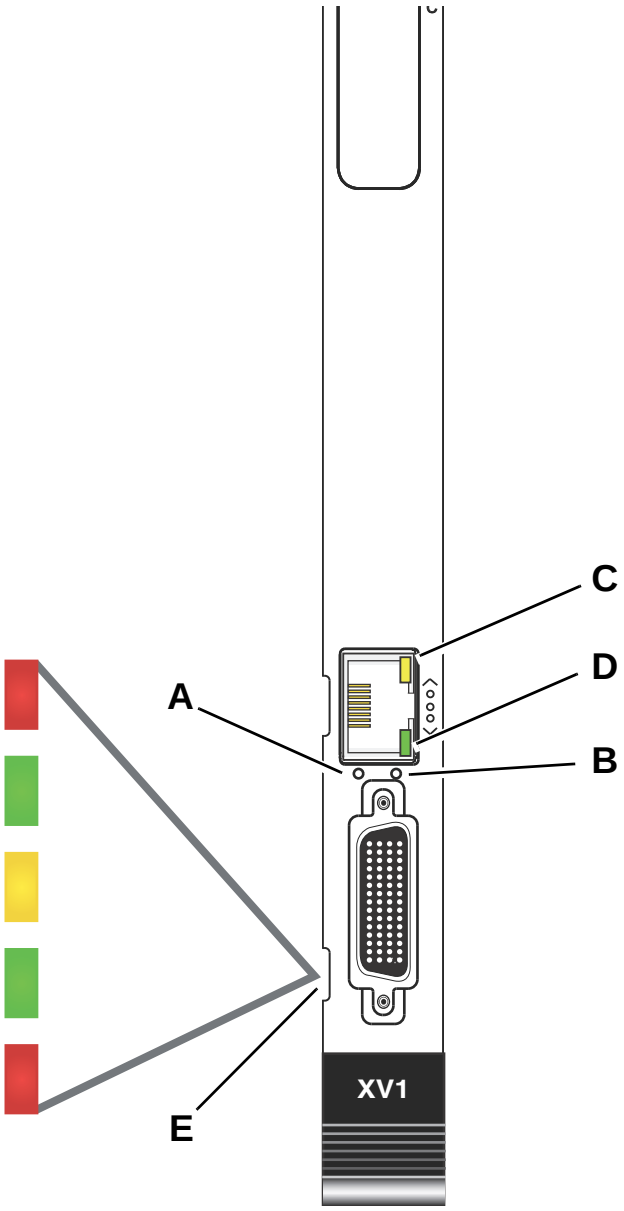


Figure C-6. XV1 Front-Panel LEDs

Table C-2. Front-Panel LED Interpretation

Item	Callout[a]	Function	Color	Frequency and/or Interpretation
Left LED	**A**	System Status	Green	This LED indicates system status. It flashes at a 1-hertz rate as the board goes through BIOS POST. When the POSTing is completed, it turns solid green. If any power rail fails, the LED will not light either during POST or afterwards.
Right LED	**B**	Drive Activity	Yellow	This LED indicates drive activity for either a SATA drive or the Compact Flash. When the BIOS is POSTing, this LED flashes at a 1-hertz rate.
Gigabit Ethernet Port C	**C**	Link Speed	Off	10 Mbit/s
			Green	100 Mbit/s
			Amber	1000 Mbit/s
	D	Network Activity	Green	LED lights when traffic is detected on the network

a—Callouts A—D are From *Figure C-6* on page C-7.

C.3.1 PCB LEDs

The XV1 has a group of five important LEDs located on the bottom side of the board near the front panel. To allow the user to view these LEDs while the unit is mounted in a rack, a special viewing notch has been designed into the lower left side of the faceplate. This notch, along with a representation of the LEDs can be seen in *Figure C-6* on page C-7. The order of the LEDs will be described in this section in a descending order, from top to bottom, viewed as it would appear mounted in a rack.

While the XV1 BIOS is “Checkpointing”, the LEDs indicate the revision code of the FPGA. The LSB indicated by the bottom LED, and the MSB indicated by the top LED. Once the OS starts booting, the LED behaviors are as described below in *Table C-3* on page C-9.

Table C-3. Board LED Interpretation (Callout E[a])

LED Location	Function	Color	Frequency and/or Interpretation
1st LED (Top)	System Error	RED	This LED indicates a system error. This error may require a reset of the board to return to an operational state. LED will continue to blink as long as power is not removed. Power cycling the board down will clear this LED.
2nd LED	System Controller	Green	This LED (**on**) indicates the board is the System Controller. Clock, System arbitration, and interrupt handling are tasked to the System Controller. When the LED is **off**, board is configured as a non-System Controller.
3rd LED	CPU Temperature (Warning)	Yellow	This LED indicates the CPU's temperature has exceeded safe operating levels. When this state has been reached, the TCC (Thermal Control Circuit) will start throttling.
4th LED	Optional	Green	This LED is available for use by any application. It will remain off until either or both of GP50 and GP51 of the Super IO is driven low. The LED is driven by the product (GP50 & GP51) of the two signals.
5th (Bottom)	VME Failure	Red	This LED lights when the VME System Failure signal is asserted.

a—Callout E is From *Figure C-6* on page C-7.

C.4 FPIO-Expansion Board

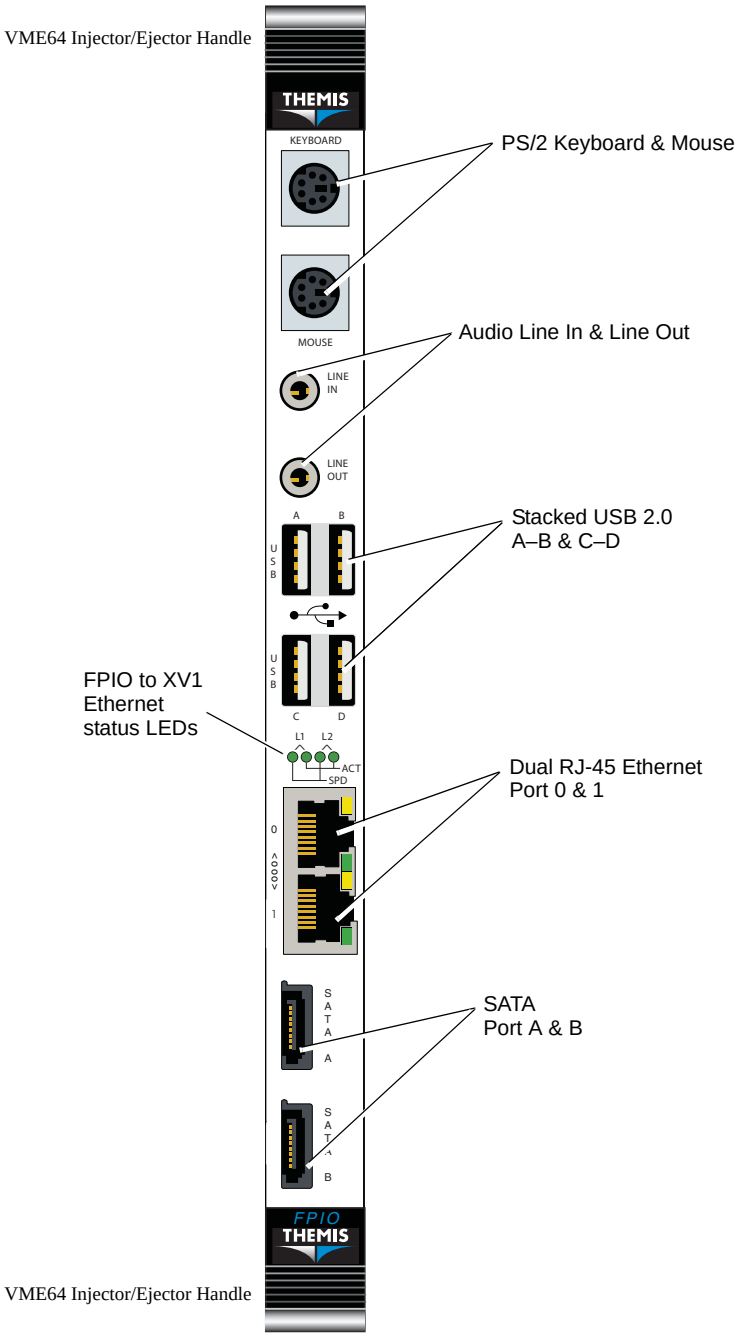


Figure C-7. FPIO Front Panel I/O and LEDs

C.4.1 FPIO-Expansion Board LEDs

The FPIO-Expansion Board has LEDs on the front panel, as well as the component side of the PCB. The front panel LEDs depict Ethernet status and the PCB LEDs are useful for debugging purposes.

C.4.1.1 Front Panel LEDs

Below (*Figure C-8*) is a drawing of the front panel LEDs. The description for these LEDs can be found in table *Table C-4* on page C-12. The LEDs marked in callout A represent the connection between the FPIO-Expansion Board and XV1. The LEDs marked in callout B represent the connection between the RJ-45 ethernet port and the device to which it is connected (*i.e.*, router, gateway, etc.)

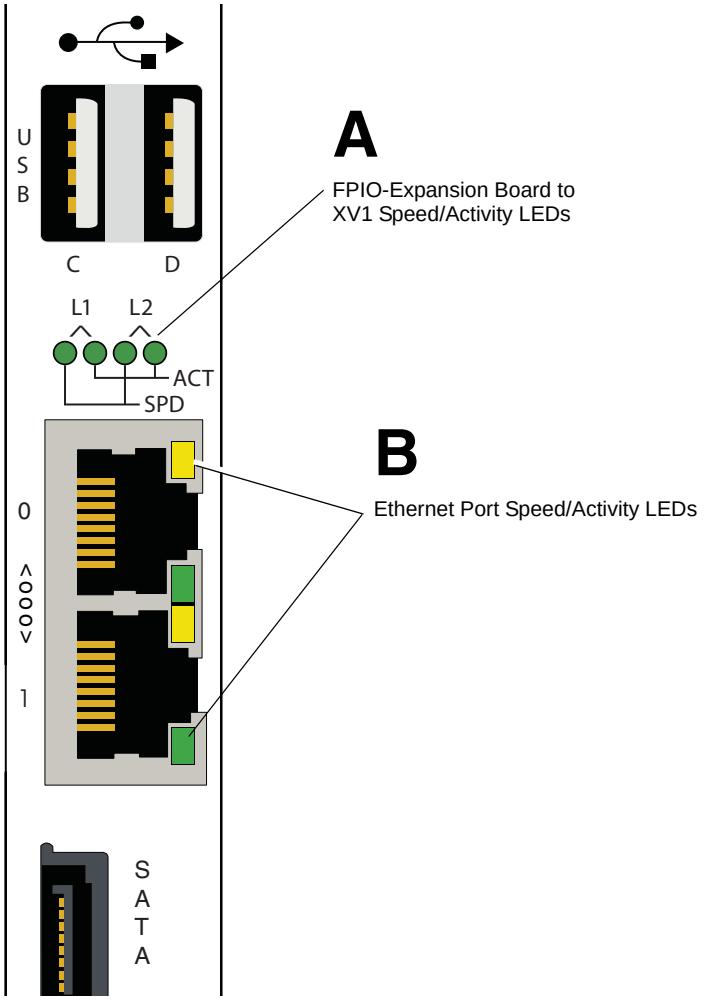


Figure C-8. FPIO Front Panel LEDs

Table C-4. FPIO Front Panel LED Descriptions

Item	Callout[a]	Function	Color	Frequency and/or Interpretation
L1	A	Link Speed	Off	"Not Gbit/s" This condition indicates a speed other than 1 Gbit/s. The resulting speed being either 10 Mbit/s or 100 Mbit/s. There is no way to differentiate from the LED if the link speed is at 10 Mbit/s, or 100Mbit/s.
			Green	1Gbit/s (1000 Mbit/s)
		Network Activity	Green	LED lights when traffic is detected on the ethernet connection between the FPIO-Expansion Board and XV1.
L2		Link Speed	Off	"Not Gbit/s" This condition indicates a speed other than 1 Gbit/s. The resulting speed being either 10 Mbit/s or 100 Mbit/s. There is no way to differentiate from the LED if the link speed is at 10 Mbit/s or 100Mbit/s.
			Green	1Gbit/s (1000 Mbit/s)
		Network Activity	Green	LED lights when traffic is detected on the ethernet connection between the FPIO-Expansion Board and XV1
Gigabit Ethernet Ports 0 & 1	B	Link Speed	Off	10 Mbit/s
			Green	100 Mbit/s
			Amber	1000 Mbit/s
		Network Activity	Green	LED lights when traffic is detected on the network

a—Callouts are From *Figure C-8* on page C-11.

C.4.1.2 FPIO-Expansion Board PCB LEDs

The FPIO-Expansion Board has 7 LEDs on the component side of the PCB which can be used to check the status of certain functions. These LEDs are primarily used as a visual indicator for debugging purposes. *Figure C-9* on page C-13 shows the location of the LEDs on the PCB. The description for the FPIO-Expansion Board PCB LEDs can be found in *Table C-5* on page C-14.

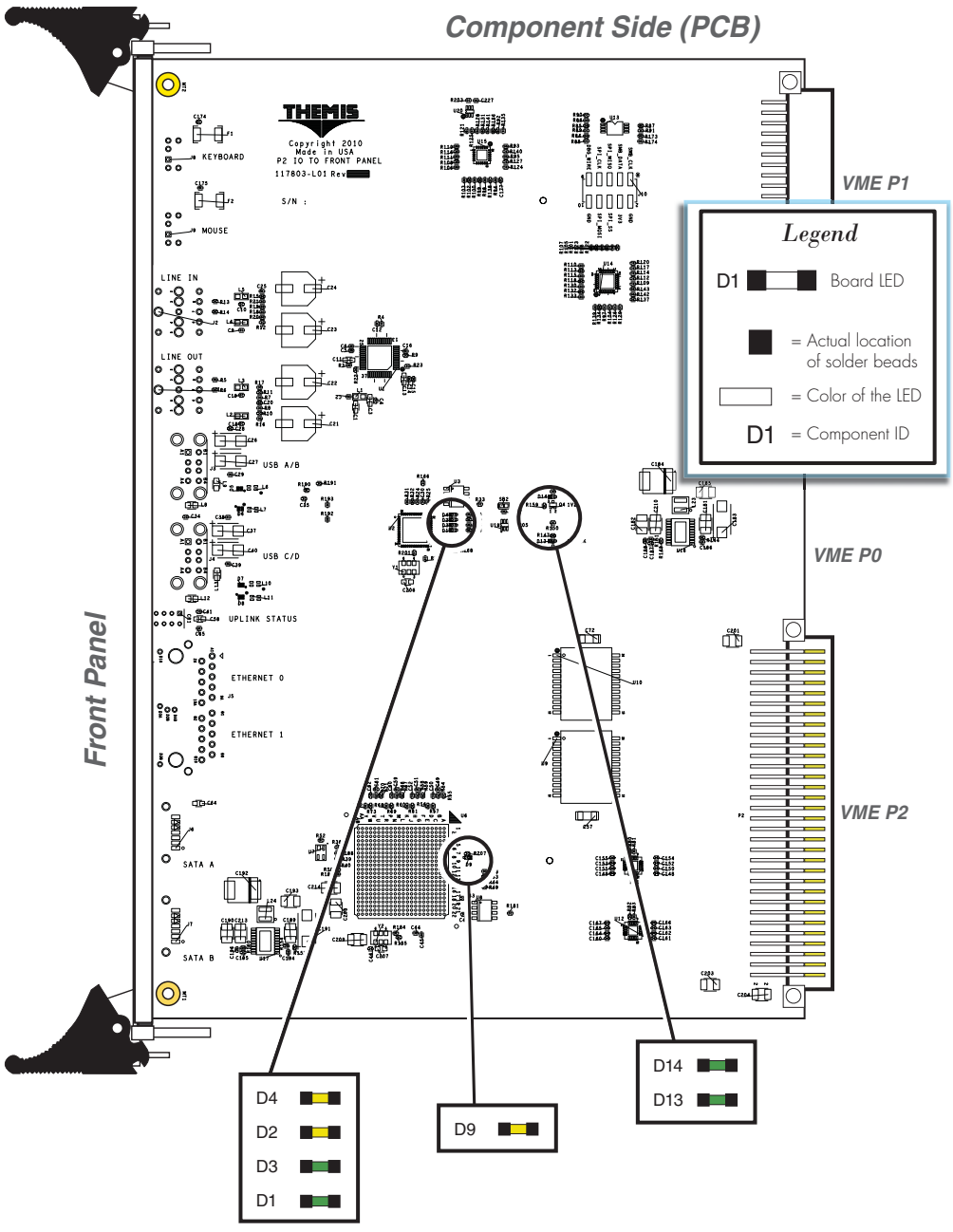


Figure C-9. FPIO PCB LED Locations

Listed below are the LED Descriptions for the FPIO-Expansion Board PCB.

Table C-5. FPIO PCB LED Descriptions

LED ID	Function	Color	Frequency and/or Interpretation
D1	USB1 Activity	Green	This LED (**on**) indicates activity with USB1
D2	USB1 Over Current	Yellow	This LED (**on**) indicates USB1 is over the acceptable current levels
D3	USB2 Activity	Green	This LED (**on**) indicates activity with USB2
D4	USB2 Over Current	Yellow	This LED (**on**) indicates USB2 is over the acceptable current levels
D9	Ethernet Loop back	Yellow	This LED (**on**) indicates a detection of a loop back in the ethernet
D13	3.3V Power	Green	This LED (**on**) indicates there is no failure in the 3.3V power rail; 3.3V power is ok
D14	1.2V Power	Green	This LED (**on**) indicates there is no failure in the 1.2V power rail; 1.2V power is ok

Appendix D

Board Component and Connector Diagrams

The following sections of this appendix contain diagrams of the various boards of the XV1. It is intended as a quick reference to component and connector identification. XV1 boards included are:

- Baseboard
- P2 Paddle Board
- FPIO-Expansion Board

D.1 XV1 Baseboard

Figure D-1 on page D-2 identifies front-panel, major board-surface components, and connectors as seen from the top side of the XV1 Baseboard.

D.2 P2 Paddle Board

Figure D-2 on page D-3 identifies the major connectors on the P2 Paddle Board, as viewed from the top side.

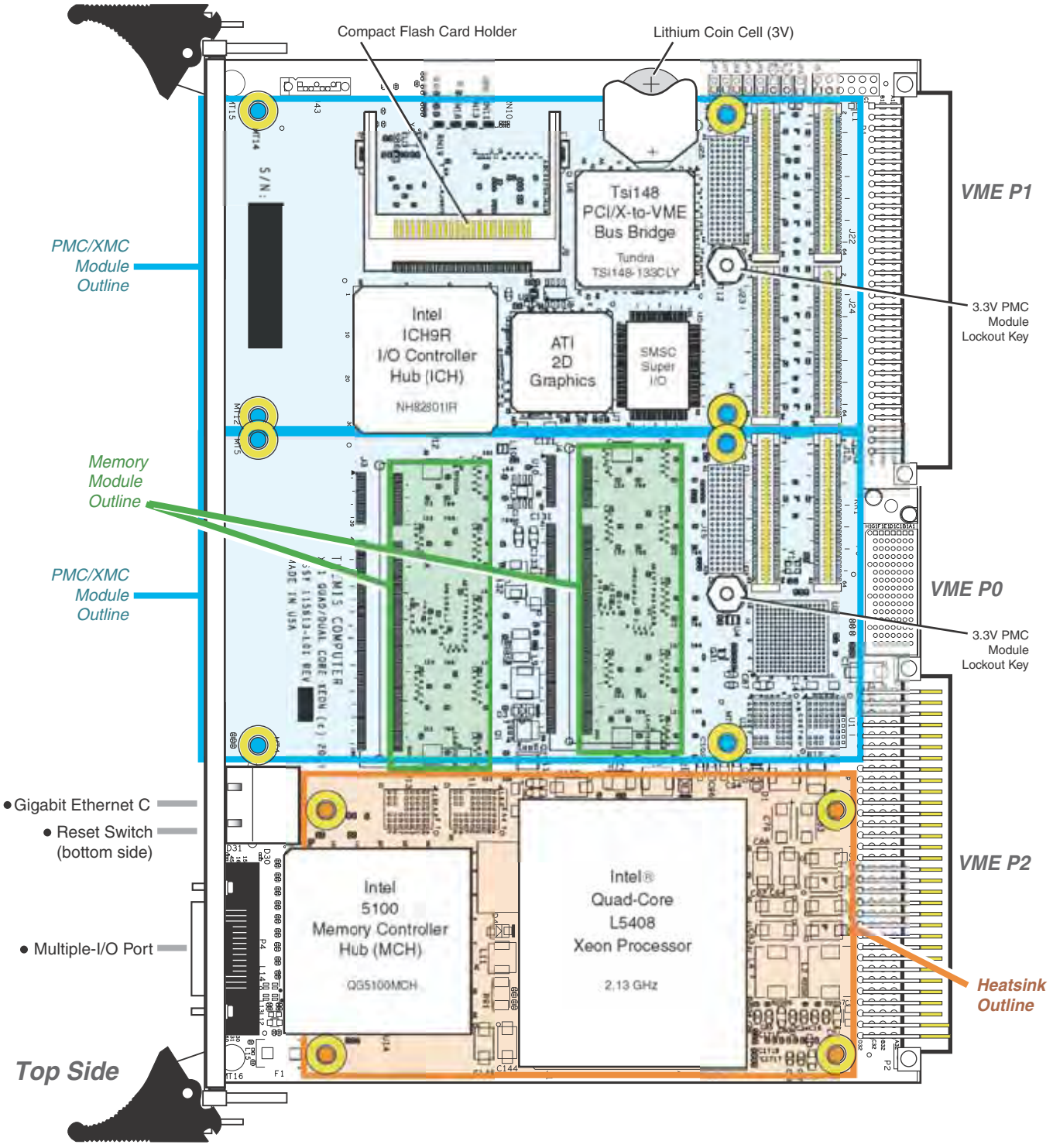


Figure D-1. XV1 Component and Connector Diagram (Top Side)

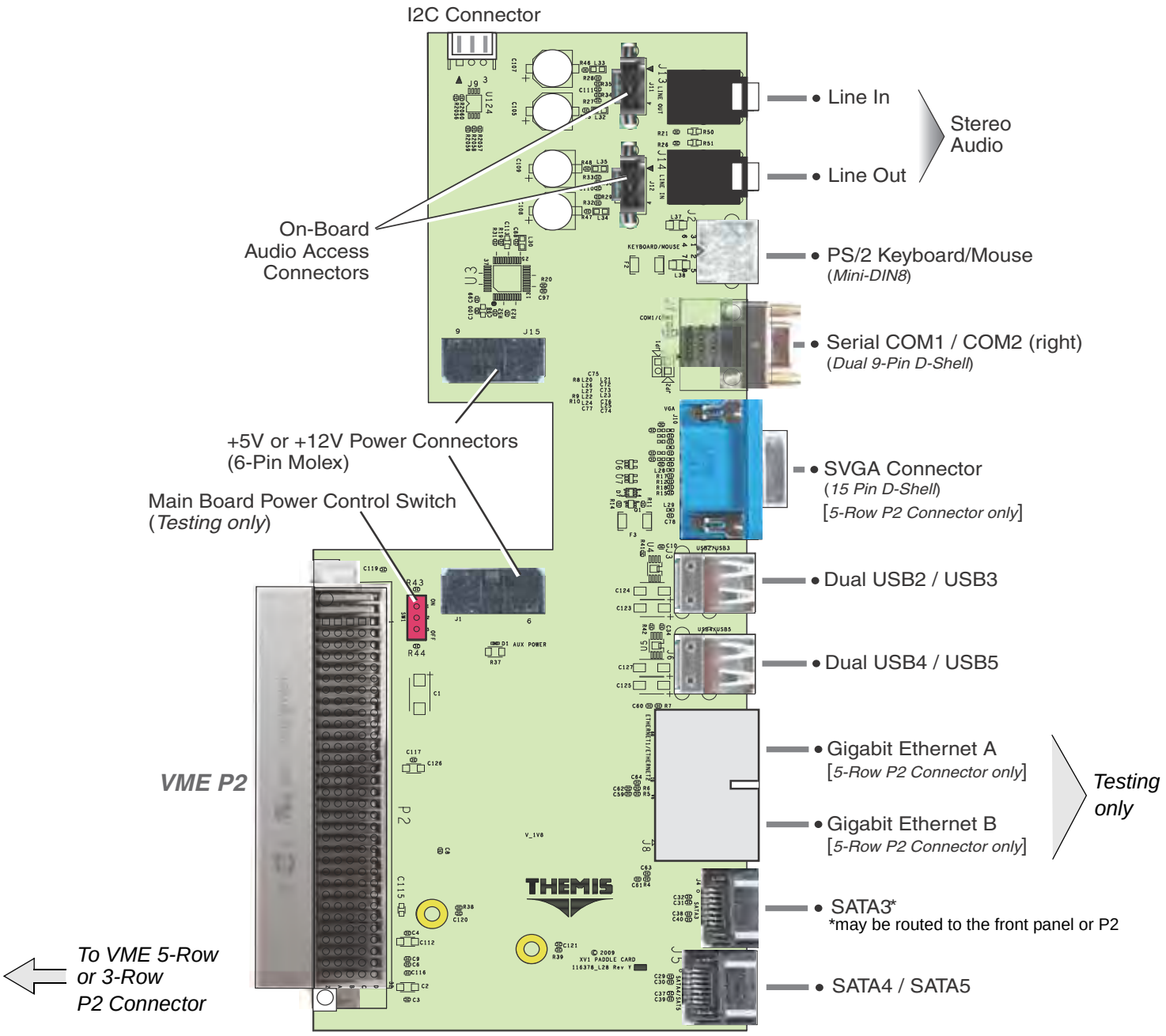


Figure D-2. Paddle Board Component and Connector Diagram (Top Side)

Caution: Connect the Paddle Board to the **P2 connector** of the VME Backplane only. Connection to the P1 connector will cause operational malfunctions as well as possible damage to both the Baseboard and the Paddle Board.

D.3 FPIO-Expansion Board PCB

Figure D-3 below identifies front-panel, major board-surface components, and connectors as seen from the top side of the FPIO PCB.

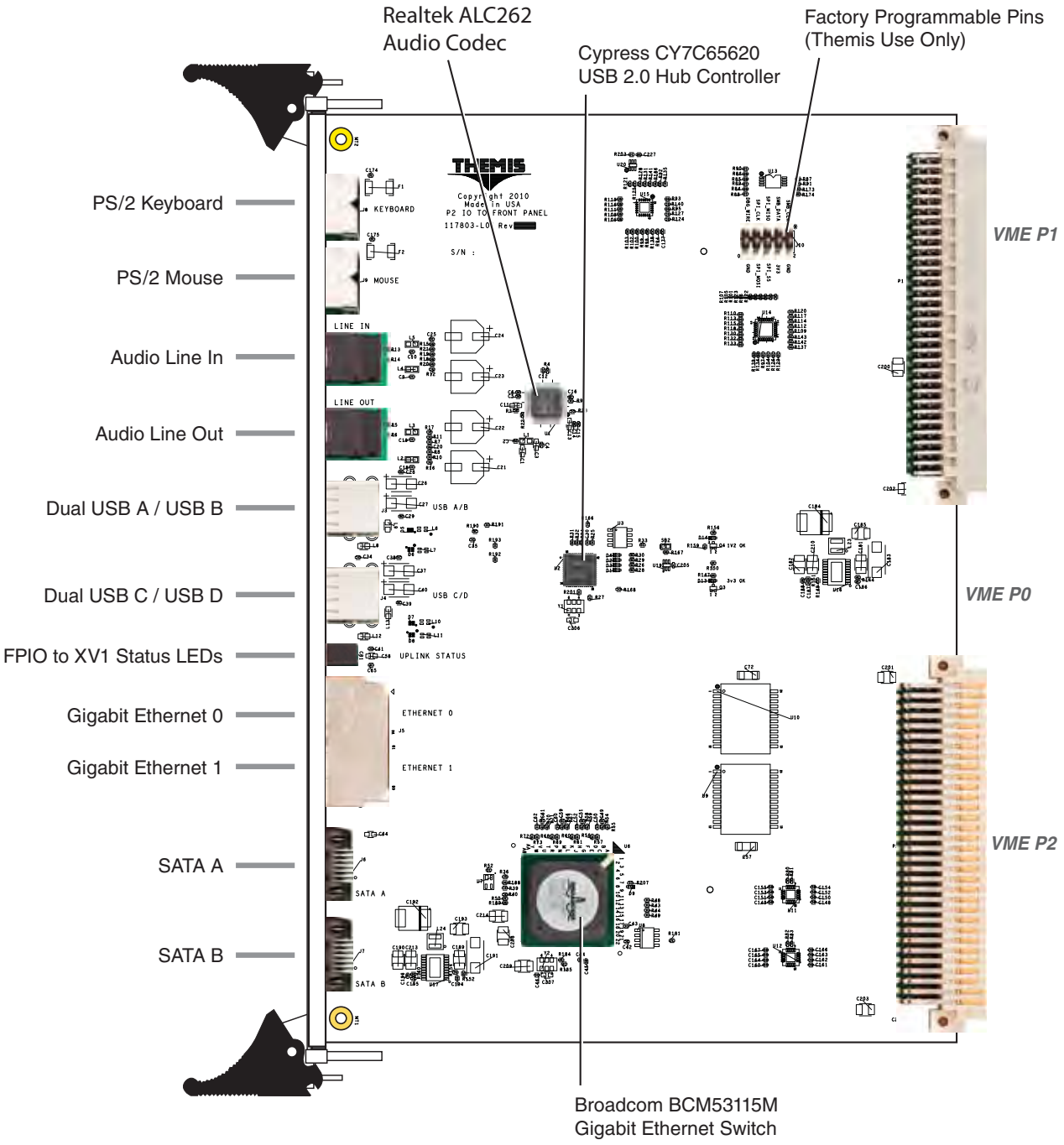


Figure D-3. FPIO Component and Connector Diagram (Top Side)

Appendix E

VME Slot Configurations

The following 11” x 17” foldout (see *Figure E-1* on page E-3) illustrates the slot configurations of all models of the XV1. Users may supplement the onboard XV1 graphics capability by installing a TGA-7000 PMC graphics accelerator card in an available PMC Module slot, or a T2GPX XMC graphics card in a available XMC Module slot.

Table E-1 summarizes all model configurations.

Table E-1. XV1 Model Configurations

Model	Baseboard
	PMC/XMC Modules
XV1 / 1	1 Module (1 VME Slot)
XV1 / 2	2 Modules (2 VME Slots)
XV1 / 3	3 Modules (2 VME Slots)

Caution: The original Themis 2P2 PMC/XMC Carrier Board or 2P2/2P3 PMC Carrier Boards cannot be installed onto the XV1. A different PMC/XMC Carrier Board is available for use with the XV1. Please contact Themis for further details.

XV1

A **Model XV1 / 1**

Front Panel

Baseboard

1 PMC Slot

Top View

B **Model XV1 / 2**

Baseboard

0

2 PMC Slots

Top View

C **Model XV1 / 3**

I/O Expansion Board

2 PMC Slots

Baseboard

1 PMC Slot

Top View

Note: The I/O Expansion Board is only 2/3 high (4RU).

= Single-height heat sink.

= Double-height heat sink.

* Approved PMC Cards supported by Themis:

1 _____

2 _____

3 _____

4 _____

5 _____

5/2009

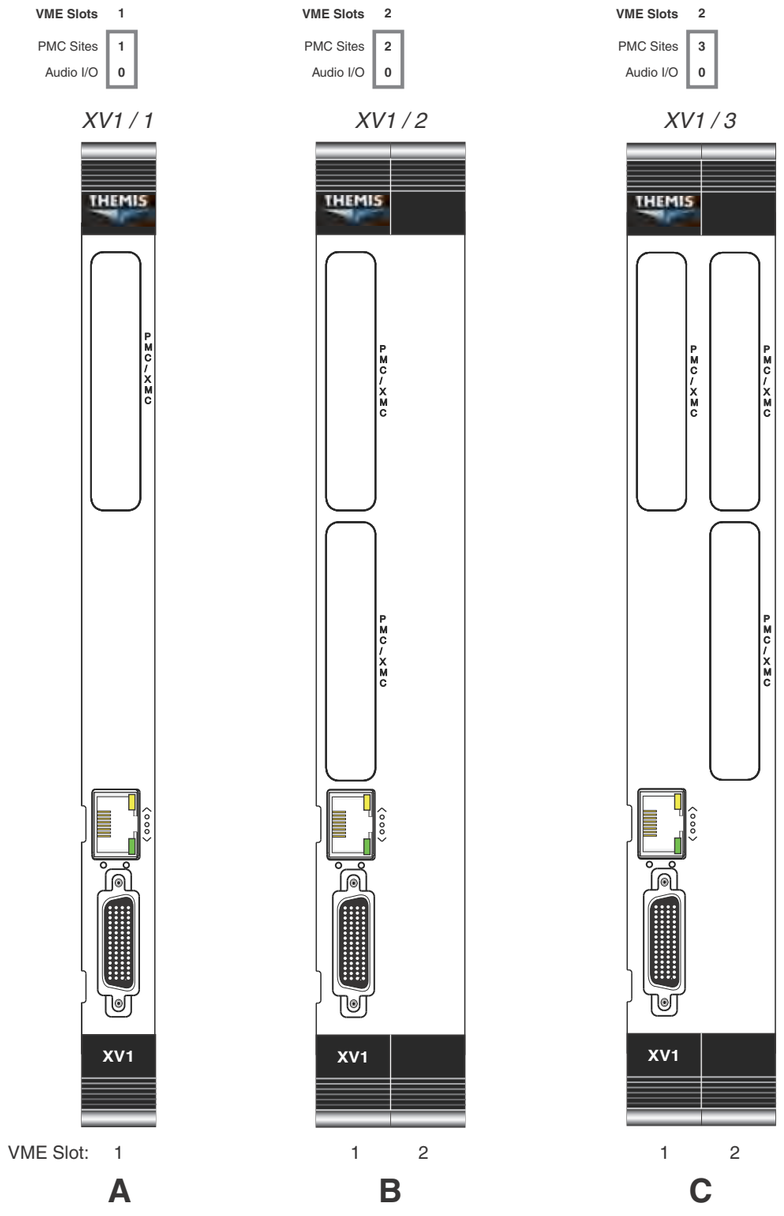


Figure E-1. XV1 VME Slot Configurations

Appendix F

Repackaging Instructions

F.1 Repackaging for Shipment

If it becomes necessary for any reason to return your XV1 unit back to Themis, it is very important that the original packaging materials be used according to the repackaging instructions found in this appendix. Themis has qualified all of its shipping materials to meet the highest of standards and the rigors of today's shipping methods, thus insuring total protection of the product during delivery. Failure to use original packaging materials, exactly as described in this appendix **may invalidate the warranty**. If the original packaging is no longer serviceable, or no longer available, please contact Themis Customer Support for a new shipping box to send back your XV1. When using the original packaging, please remember to place your XV1 back into the static protection bag.

Caution: Failure to use the original Themis packaging materials, and failure to follow the instructions of this Appendix F, **may invalidate the warranty**.

The following instructions assume the original packaging components are still available, and in serviceable condition. If not, please contact Themis for a new shipping box and packaging components for your XV1.

F.2 Packaging Components

The original packaging components are shown in *Figure F-1*. They comprise a packaging box, perimeter crush resistant foam, and upper (perimeter) crush-resistant removable foam pieces to accommodate all XV1 variations. The top and bottom crush-resistant foam layers are identical components, placed so that the flat side is always facing up (opening of box).

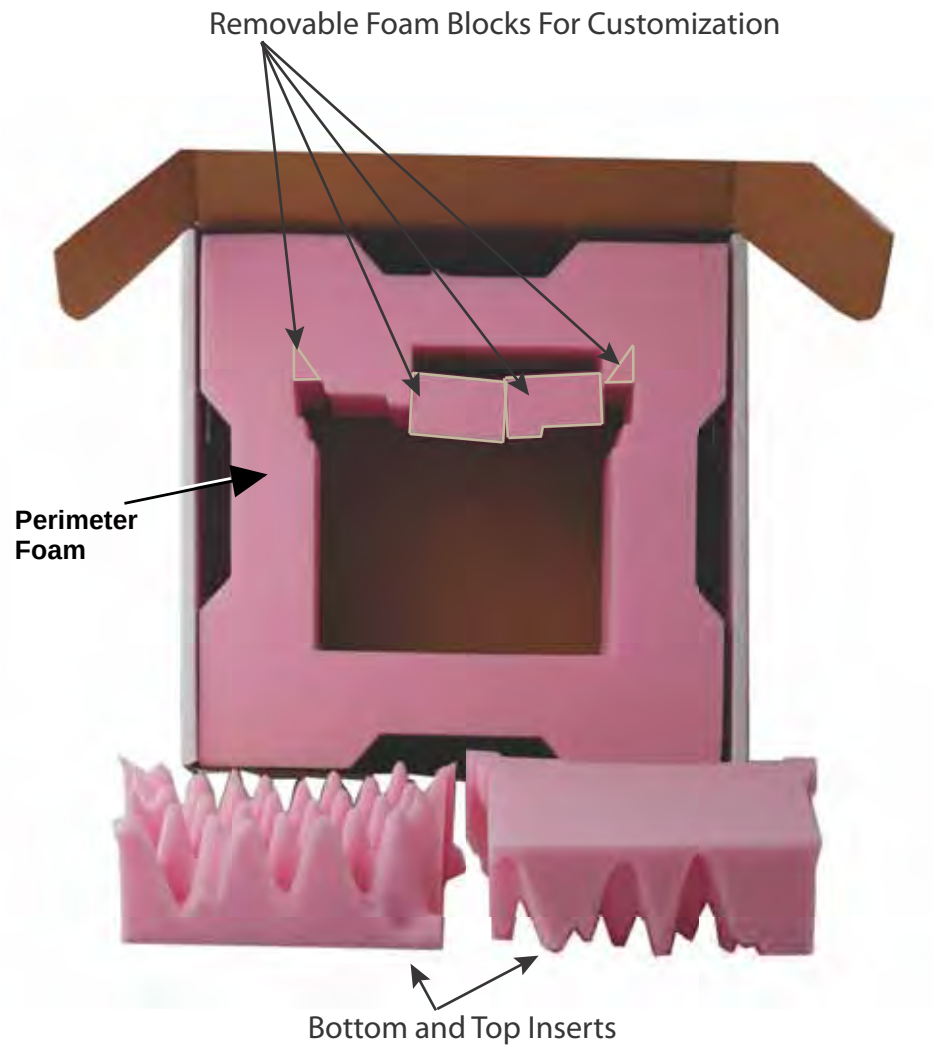


Figure F-1. Packaging Components

F.3 Instructions for Repackaging

Re-assemble the packaging material about the equipment in accordance with the following instructions (see *Figure F-2* on page F-4):

1. Inspect the original packaging materials for serviceability.
2. Place perimeter crush-resistant layer into the shipping box, making sure the corners of the foam fit snugly into the corners of the box.
3. Place the first top/bottom layer into the box, centered into the perimeter foam cutout. Make sure the flat side of the foam is facing up (opening of box).
4. Place the wrapped (static protection bag) XV1 on top of the layer (top/bottom layer) that was just inserted into the middle of the shipping box.
5. Place the remaining top/bottom layer directly on top of the wrapped XV1 unit. Make sure the flat side of the foam is facing up (opening of box).
6. Make sure all components of the box are firmly in place, pressing down on the surface area of the foam to insure proper seating of the material.
7. Seal the top of the box with strong packaging tape, wrapping the tape completely around the box, both lengthwise, and crosswise.
8. Prepare for shipment in accordance with the instructions received from Themis Computer.

Note: Please contact Themis if new packaging material, or shipping instructions are required. You can reach Themis at 1 (510) 252-0870 Mon–Fri, 8am–5pm PST, or by Email to support@themis.com.

The order of assembly when repackaging the XV1 for shipment as shown in *Figure F-2*.

Figure F-2. Order of Assembly

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Place
Stamp
Here

Themis Computer
47200 Bayside Parkway
Fremont, CA 94538
Attn: Publications Department

Fold here; tape at top to seal

Reader Comment Card

We welcome your comments and suggestions to help improve the *XV1 User Manual*. Please take time to let us know what you think about this manual.

- Information provided in the manual was complete.

  Agree___ Disagree___ Not Applicable___

- Information was well documented and easy to follow.

  Agree___ Disagree___ Not Applicable___

- Information was easily accessible.

  Agree___ Disagree___ Not Applicable___

- The manual was useful.

  Agree___ Disagree___ Not Applicable___

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  _____

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